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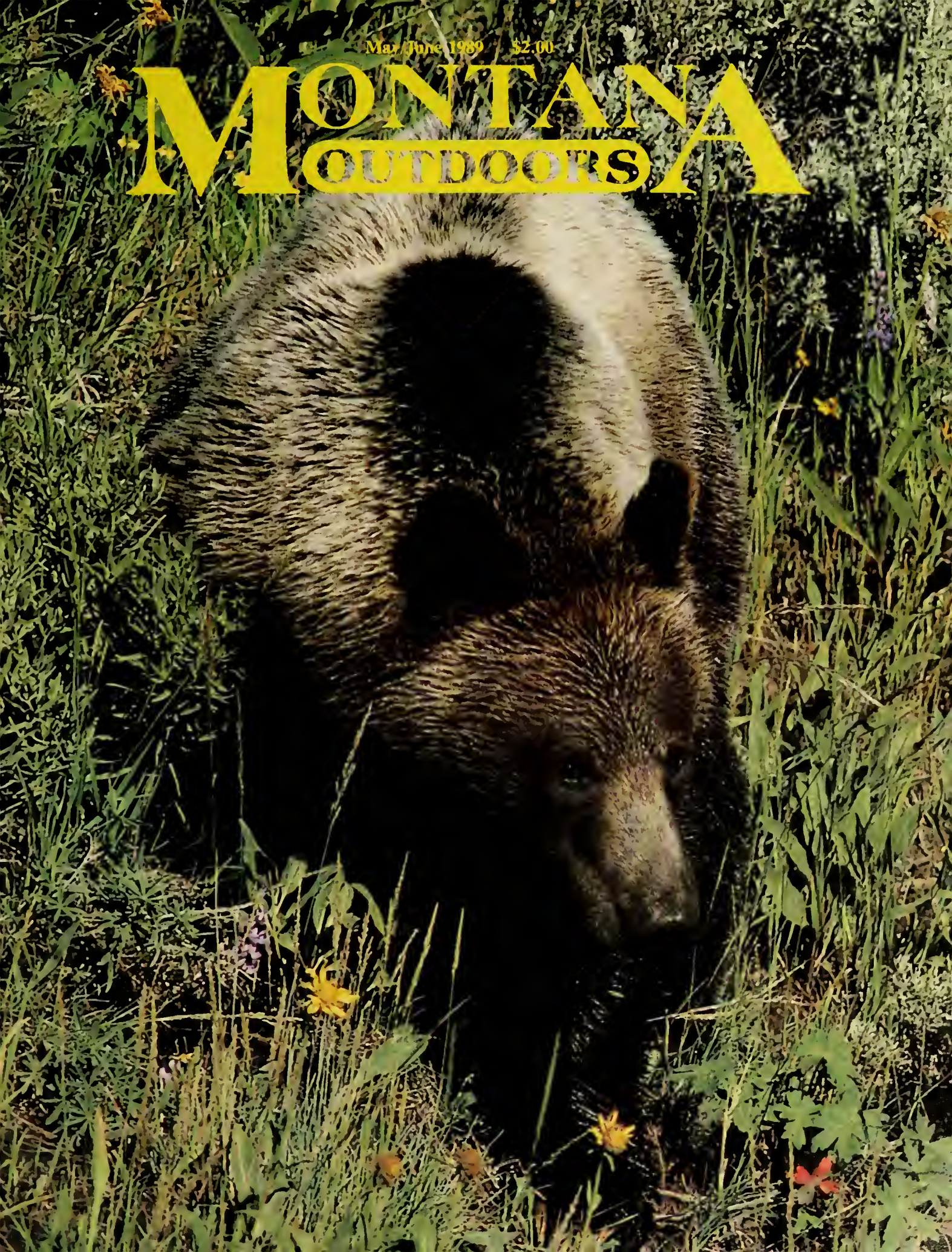
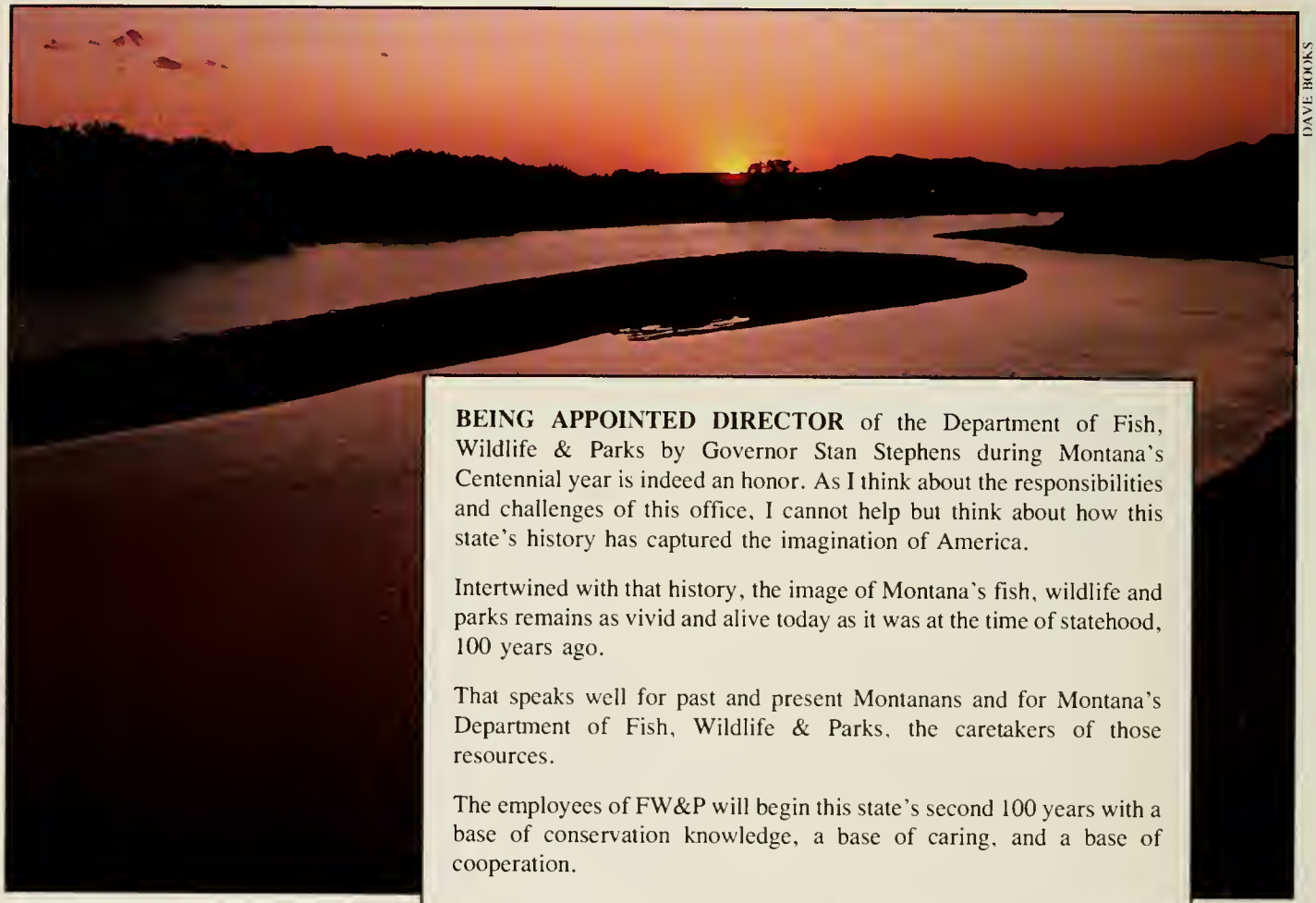
MONTANA OUTDOORS



OUR POINT OF VIEW



DAVE BOOKS

BEING APPOINTED DIRECTOR of the Department of Fish, Wildlife & Parks by Governor Stan Stephens during Montana's Centennial year is indeed an honor. As I think about the responsibilities and challenges of this office, I cannot help but think about how this state's history has captured the imagination of America.

Intertwined with that history, the image of Montana's fish, wildlife and parks remains as vivid and alive today as it was at the time of statehood, 100 years ago.

That speaks well for past and present Montanans and for Montana's Department of Fish, Wildlife & Parks, the caretakers of those resources.

The employees of FW&P will begin this state's second 100 years with a base of conservation knowledge, a base of caring, and a base of cooperation.

To maintain and improve Montana's heritage of fish, wildlife, and parks will take great skill, great vision, great desire, and great commitment. To maintain this heritage will take cooperation from you and each and every one of us. We must be far-sighted enough to anticipate change and use it to our advantage, for we will be tested, as were our predecessors.

As the stewards of those resources, the Montana Department of Fish, Wildlife & Parks looks forward to working with all of you as we learn from change and change to learn.

K.L. Cool
Director
Montana Department of Fish, Wildlife & Parks

Turn to page 13 for an article on the "Glaring Gnome."

MONTANA OUTDOORS

May/June 1989
Volume 20, Number 3

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Front Cover—The article that opens this issue begins: "I watched from a pine-studded butte as the first rays of the sun brought colors alive across the spring-tinged prairie." It continues, "...he stepped out from the shrubby cover and began an easy saunter...the sheen from his dense fur changed from silver to gold as sunlight reflected from his rippling shoulder hump and sides." It's an article about grizzly bears, and **Michael H. Francis** could have had it in hand as he photographed our front cover.

Back Cover—Montana has a wealth of parks, and some of them offer quite a spread of historic and archaeological treasures. The excitement of experiencing the past is contagious, as the back cover photograph by **Dick Ellis** implies.

State of Montana
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Fish and Game Commission
Errol Galt/Chairman
Greg Barkus
F.W. Howell
Bob Jensen
William Stratton

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Of Prairie, Bears, and People

by Mike Madel

I WATCHED FROM A PINE-STUDDED BUTTE as the first rays of the sun brought colors alive across the spring-tinged prairie. As if to voice glad approval, a meadowlark uttered its melodious warble, beginning the world of day sounds. The bear appeared suddenly, along the edge of a willow shrub field. He stood there momentarily, nose held high, broad head moving from side to side, allowing the air currents to transfer messages of meaning. Boldly, he stepped out from the shrubby cover and began an easy saunter across the grassland. The sheen from his dense fur changed from silver to gold as sunlight reflected from his rippling shoulder hump and sides.

I remained motionless, not so much from fear of attracting notice as from marvel at the untamed character and strength of such an animal. The bear ambled across the open prairie, stopping occasionally to turn over a weathered manure pile in search of insects, or to investigate more closely his world of odors so foreign to us humans. So quickly did he turn and stand tall on hind legs, looking in my direction, that I felt unprepared. Surely he can't know I'm up here, some 200 feet higher on the butte, I surmised. But the wind had shifted. Dropping down on all fours, the bear burst into a staggered run toward me. Just as abruptly, he stopped and stood again, his front feet and light-colored claws held against his chest. I could see him expel a plume of warm air from his mouth. Now my adrenalin pump was working at full speed. Just as suddenly as the bear had arrived, he vanished—at full run, hind legs ahead of front—into a sea of shrubs.

Rocky Mountain Front photo MIKE MADEL

PETE & ALICE BENGEYFIELD

Breathing easier and my pulse returning to normal, I gazed across the vastness of the rolling Montana prairie grassland. To the west were the sheer cliffs of the Rocky Mountain Front. I could see the Teton River drainage reaching deeper into the mountains bordering the Bob Marshall and Great Bear wildernesses.

EXCEPT FOR AN OCCASIONAL FENCE LINE, observing the bear out here was similar to what Lewis and Clark experienced nearly two centuries ago in the open plains along the Missouri River. The "great white bear," as they described the grizzly, was well adapted for open country and ranged

across most of western North America until the early 1800s. It disappeared from the plains and much of its former range because of the westward tide of human settlement, receding to the most remote and rugged mountain ranges. It is believed that grizzly populations were lowest during the early part of the 1900s.

Montana contains the largest remaining grizzly bear population in the lower 48 states. In northwestern Montana, these bears occupy 5.7 million acres in what is called the Northern Continental Divide Ecosystem. Along the east slope of the Continental Divide, from the Canadian border south to Rogers Pass, lies a portion of the ecosystem called the Rocky Mountain Front. Here, where the Great Plains abruptly meets the rugged limestone reefs of the Sawtooth Mountain Range, lies a geological transition zone with an array of habitats supporting diverse native wildlife.

The Rocky Mountain Front is a unique segment of the ecosystem—in fact, of the entire continent—because it contains the last plains habitat occupied by the grizzly bear. Although we'll probably never know for certain, these bears could be descendants of the plains grizzlies described by Captain Meriwether Lewis in 1805 and painted by Charlie Russell a hundred years later.

Over the past decade, research in the Rocky Mountain Front area has provided a pool of information on grizzly biology and ecology. Department of Fish, Wildlife and Parks (FW&P) studies have determined that the population has healthy reproductive rates and that it is increasing. Researchers estimate one bear per 20 square miles in the Front; fewer bears inhabit the southern end of the Northern Continental Divide Ecosystem, while populations are denser to the north, near Glacier National Park, where habitat quality is higher.

The Rocky Mountain Front grizzly bear is a creature of both plains and mountains. Its omnivorous diet includes a wide variety of plants and animals and, at times, it may be a grazer, scavenger, or predator. Because the grizzly is not a highly efficient predator, it depends heavily on grasses, forbs, roots, berries, and pine nuts. The availability of high-energy plant foods from one season to the next dictates where grizzlies move, how they use the habitat, and even the size of their home range each year.

THE FIRST GREEN-UP FOLLOWING THE MELTING SNOW early in spring draws grizzlies down to low elevations after they emerge from their mountain dens. During April, May, and June, grizzlies travel onto the shortgrass prairie east of the foothills in what historically was their "home on the range." Some individuals move as far as 20 miles east of the Front. In 1985, a young silvertip was captured on a farm north of Fairfield, about 35 miles from the foothills.

While using the plains, grizzlies are usually nocturnal, using the darkness as a form of cover. They confine traveling, feeding, and bedding to river and creek bottoms that act as long corridors through expanses of grassland. This streamside habitat provides bears with succulent vegetation to graze on while they are concealed by dense shrubs and timbered canopies.

By early summer, most prairie bears return to the mountains. Following the receding snowpack, they feed on the early growth stages of plants. Other sources of food become available as the bears move to higher elevations. Roots and tubers, ants and moths, whitebark pine nuts, and berries contribute to the grizzly's diet. Food high in protein, sugar, and starches is necessary for bears to gain sufficient weight before hibernation (see "What Bears Take For Granted," *Montana Outdoors*, Nov./Dec. 1988). During summer and autumn, grizzlies sometimes move down onto the plains in search of ripening serviceberry, chokecherry, and thorny buffaloberry that grow along watercourses.

Researchers have found that a portion of the Rocky Mountain Front population deviates from this general pattern. One group of bears, aptly called the "lowland grizzlies," spends its entire active year on the plains, feeding, resting, and rearing young. They use mountainous terrain only for denning and hibernating the winter away.

Another group of bears never leaves the mountains, not even to use the foothill region. They spend the spring season in rugged high country, causing even the most knowledgeable biologist to wonder what they subsist on.

Because the grizzly is an "opportunist" and has the innate ability to learn from experience, it can rapidly adapt to changes in its environment. If new sources of nourishment, from natural or unnatural sources, become available, bears are quick to locate and use them. Grizzlies have discovered alternate sources of food such as livestock carrion, human refuse, and domestic beehives.

ON THE FRONT, CONFLICTS BETWEEN PEOPLE AND GRIZZLY BEARS have increased steadily since 1980. These "conflicts" include people simply seeing bears nearby, actual confrontations, or, at times, property damage and livestock depredation. Many problems with bears are related to unnatural foods drawing bears to specific areas, such as near ranch buildings, livestock, campgrounds, or rural communities. As bears become accustomed to people and their activities, they gradually lose their fear of humans. Grizzlies accustomed to people or, possibly worse, "food-conditioned," will sooner or later have to be removed as nuisance bears.

Human-bear conflicts have posed special management problems. The grizzly bear is currently managed by the FW&P as a big game species. Within this legal framework, the state has the mandate to protect, conserve, and manage grizzly bears as a rare species of Montana wildlife. In 1975, the grizzly was placed on the Federal Endangered Species List, thus mandating additional provisions to ensure its survival.

To minimize conflicts while also maintaining a recovered population, the FW&P developed a regional plan in 1986. The Rocky Mountain Front Grizzly Bear Management Program contains four management strategies: (1) human-bear conflict management, (2) grizzly population management, (3) grizzly habitat management, and (4) periodic program evaluation. The program supports the goals of the 1982 U.S. Department of the Interior's Grizzly Bear Recovery Plan and meets objectives outlined in the 1986 FW&P "Programmatic Environmental

Impact Statement for the Grizzly Bear in Northwestern Montana" (see "Managing the Grizzly Bear," *Montana Outdoors*, May/June 1986).

The Rocky Mountain Front plan encompasses local considerations such as social issues, land ownership, and information on grizzlies from 10 years of studies on the Front (1977-87). To develop "bear management zones," we identified seasonal and year-round grizzly habitat along with areas in which people-bear conflicts had occurred. This provided a way to prioritize and direct FW&P management activities so that department personnel could quickly respond to and resolve bear situations. Department personnel have also worked with landowners and backcountry users on ways to avoid bear conflicts.

Preventive measures have proved most effective in resolving problems related to attractants. In most cases, removal or proper storage of human food and garbage have kept conflicts with grizzlies from recurring. High-voltage electric fences have been installed around bee yards where bears have damaged hives. If properly grounded and maintained, electric fences are not only a deterrent, but they also condition grizzlies to alter their behavior and avoid bee yards.

MIKE MADEJ

High-voltage electric fences installed around bee yards have proved effective in altering grizzly bear behavior.

Most ranchers lose livestock each year to natural causes, especially during calving season. Ranchers usually dispose of the carcasses in a pit or swale not far from the calving grounds. Grizzly bears may travel long distances, well outside of their usual habitat, in search of these "bone yards" which are a rich source of protein.

As part of the management program, we began to phase out high-conflict bone yards east of the Federal Grizzly Bear Recovery Line. To avoid creating additional problems by removing protein sources on which grizzlies traditionally rely, we began to randomly redistribute livestock carcasses closer to the Rocky Mountain Front in isolated pockets of grizzly spring range and big game winter habitat. Landowners have been cooperative, and some ranchers are distributing carcasses in remote areas on their own land. Initial results appear promising: a significant decrease in problem bears in the Teton River area.

Despite the most intensive management plan, conflicts between grizzlies and man will continue. Control actions are an inevitable part of management. Bears that cause property damage or extend their movements far outside of occupied grizzly habitat must be removed. Relocating nuisance bears back into wild areas is often only a temporary solution. The causes of a conflict need to be addressed and appropriate measures taken to resolve them. Individual bears that learn to prey on sheep or cattle create a difficult situation; if such grizzlies can't be prevented from further depredations, repeat offenders must be destroyed.

MICHAEL H. FRANCIS

Animal carcasses are a rich source of protein, and grizzlies will travel long distances to seek them out.

FOR GRIZZLY BEARS IN THE ROCKY MOUNTAIN FRONT, favorable winds of change are blowing. Problem bear situations have decreased 52% since 1986, while reproductive rates have remained stable. More significant, carrion- and garbage-related conflicts have dropped by 71%. Social acceptance—or, more accurately, "tolerance"—for the grizzly has also risen over the last few years.

In addition, methods to assess effects of various land use activities on grizzly habitat have been refined through coordination efforts by both federal and state agencies. Over the long haul, maintaining suitable habitat is the key to maintaining a healthy, recovered grizzly population.

For the great white bear, survival and existence on this last remnant stretch of plains habitat depends on whether man will allow its cohabitation. If some complex factors can be worked out, the prairie grizzly will continue to roam the Rocky Mountain Front, just as it did when Lewis and Clark first observed it on the open plains nearly two centuries ago.■

ON FISHING...

FW&P PHOTO

This fish trap on the South Fork of the Madison River provided Montana hatcheries with brown and rainbow trout eggs from the 1930s to the '50s.

With only 5.5 people per square mile, the fourth largest state is sparsely populated. From high plains to mountains, Montana's changing landscape is held together by ribbons of water. They emerge from the snowmelt on distant peaks and grow larger as the water carves through mountain valleys and flows out onto the flatlands.

In spring, as leaves begin to emerge on the willows, streams swell and lakes begin to fill. Cutthroat and rainbow trout move into hundreds of streams to dig gravel nests and lay their eggs. The last stream-dwelling Arctic grayling in the lower 48 states swim into side channels and tributaries of the Big Hole River to initiate a colorful mating display. Walleye and sauger move to spawning sites along the mighty Yellowstone and Missouri to drop their sticky eggs on the river gravels. They are followed up the rivers by prehistoric paddlefish.

These fish will give rise to the next generation, following patterns repeated for thousands of years. They represent only a handful of the 53 species native to Montana's waters and another 33 species that can now be found here—species as diverse as the lands through which they migrate. They have evolved to live at the base of glaciers, as well as in muddy prairie streams.

In their own way, many of these species have contributed to the story of fisheries management in Montana. Their value—both real and symbolic—has made for a colorful and often controversial history. The story told in full is one of biology and politics, conflict and compromise, fact and philosophy. It is the product of long-term commitment and the inspired action of many people to conserve Montana's waters and fisheries.

Native Americans were the first people to use fish in Montana. The Kutenai Indians fished for white sturgeon in the Kootenai River, their canoes fashioned with noses shaped like the sturgeon. These sturgeon fishermen were highly respected for their skill. Farther south, the Salish fished for bull trout as the fish migrated upstream and congregated in pools along the Clark Fork River.

When Lewis and Clark arrived in 1805, far fewer species of

by Patrick Graham and Art Whitney

fish inhabited Montana. For example, in the famous trout streams in the headwaters of the Missouri, there were no rainbow, brown, or brook trout—but there were Arctic grayling, cutthroat trout, and whitefish.

Settlers began to move into the state during that century. At the first Montana Territorial Legislature in 1864, legislators passed a law limiting the means of taking trout to "a rod or pole, line and hook." Eleven years later, contrary to frontier practice, use of explosives to kill fish was outlawed.

The year Montana entered the union also marked the beginning of a practice that would forever change the shape of fisheries management. The federal government introduced brown, rainbow, and brook trout into streams in Yellowstone National Park that drained into Montana. Stocking fish would be the primary management tool over the next half century.

What follows are sketches illustrating the evolution of Montana's fisheries program: from hatcheries to wild trout, preserving good fish habitat, the evolution of regulations and education, and getting to the water.

FROM HATCHERIES TO WILD TROUT

Early hatcheries were developed where springs could provide adequate sources of clean water. Stocking of fish was not limited to government programs; anybody with a milk can

F-W&P PHOTO

In the 1920s, cases of fish eggs from the Washoe Park Trout Hatchery in Anaconda were packed in ice and trucked to Butte for rail shipment to other hatcheries around the state.

and transportation could get into the act.

The 1930s saw a proliferation of stock ponds and reservoirs which increased demand for hatchery-reared fish. The first and only warm-water fish hatchery was constructed at Miles City. Because it was difficult to haul live fish long distances, many small trout hatcheries were built in the western two-thirds of the state. The fish were put wherever hatchery workers, game wardens, and anglers thought they should go, often in response to the most vocal political influence.

But almost anyone who understood the system could get some fish. In 1952, a landowner saw cutthroat trout in a shallow, muddy stockwater pond 200 miles from the nearest cutthroat hatchery in Montana. The landowner said a year or two earlier a couple of friends had traded the manager of a fish hatchery in Wyoming a fifth of bourbon for a cream can of cutthroat fry.

In the early 1940s, the department developed its first five-year stocking program for each hatchery, establishing production goals and limiting stocking to waters which produced fish. However, the assumption continued that trout fisheries could only be supported by stocking.

The first fish biologist was hired in 1947. The staff slowly grew, and after several years of study, we were ready to challenge the notion that every stream needed to be stocked regularly to maintain a fishery.

Old ideas die hard, but a new policy was developed to limit stocking to: (1) barren waters or new introductions, (2) areas where spawning was not available, (3) heavily fished streams where catchable-sized fish would be used, and (4) areas in which fish populations were being re-established after a natural disaster.

This reduced the number of waters stocked but increased the size of fish. Some of the small hatcheries could not efficiently grow larger fish because their water was too cold, so some of them closed. Also, production and transportation methods improved. By the early 1970s, the number of hatcheries had decreased from 13 to seven.

Stocking catchable trout was not without problems, though. Thirty years ago, it cost between 20 cents and 30 cents to raise a seven- to eight-inch fish. It was rare if anglers caught more than half of the catchables stocked—meaning the department spent nearly as much to fill *one* 10-fish daily limit as an angler did for the $5 fishing license.

In the mid-1960s, while investigating a habitat problem caused by low winter flows on the Madison River, biologists got a surprise. Improved winter flows produced a substantial increase in fish numbers in one sampling section and practically none in another. The only appreciable difference between the two sections was that the department stocked the first section with catchable-sized rainbow trout but did not stock the other. When stocking stopped in the first section, fish

F-W&P PHOTO

The department's first fisheries biologist was hired in 1947, and shortly thereafter the first fish shocking work was done. Electrofishing has come a long way since this photo was taken in the early 1950s.

numbers increased.

We then tried an experiment on two sections of O'Dell Spring Creek with similar numbers of fish. We heavily stocked one section, and the number of wild fish dropped. Numbers stayed the same in the other section. When we quit stocking the first section, the wild fish population rebounded.

Although biologists don't know the exact reason why planting catchables adversely affects wild trout, it undoubtedly centers around behavioral differences. Wild trout live in harmony with their natural stream environment and establish a dominance hierarchy. Hatchery trout, on the other hand, live an unnatural life; artificially fed, they are crowded in raceways and lack room or motivation to establish such hierarchies. When catchable-sized hatchery fish are planted in streams on top of wild trout populations, chaos results. Hatchery trout do not respect established territories and wild trout must either expend energy to maintain their positions or give them up entirely. Displaced or stressed wild trout have considerably less chance for survival.

The wild trout concept generated a great deal of controversy, polarizing both department personnel and the fishing public. It resulted in several of the wildest public meetings this department has ever conducted. On the basis of the hatchery/wild trout studies, the Fish and Game Commission changed the stocking policy in 1973. We would no longer stock catchable-sized trout in streams with healthy wild trout populations. Evidence that the policy change worked is seen today—greater numbers of wild trout available to the angler.

We have quit stocking catchable-sized trout in most lakes and reservoirs and stock only a handful of streams. Because it costs less and requires less space to raise fingerling-sized fish (a fingerling is three to four inches long, while a catchable-sized fish is eight or nine inches long) in hatcheries, we were able to increase the number of these smaller fish stocked in lakes and reservoirs. We stock them in waters without adequate fish reproduction; they grow to catchable size there and provide quality recreation.

We continue to stock many fish—but do so more efficiently. In 1947, the hatchery program used 25% of the department's working budget. Today, the hatchery program accounts for only 4% of the budget. In 1962, it cost 27 cents to produce a nine-inch trout; today it costs 46 cents. Considering inflation, it cost twice as much in 1962 to produce that fish as it does today.

We are also increasing efforts to preserve native strains of Yellowstone and westslope cutthroat trout. The reconstructed warm-water hatchery in Miles City has become fully operational this year. It will produce walleye, northern pike, bass, and other species to meet increasing public demand for stocking, primarily in central and eastern Montana waters. The warm-water fish program probably offers the greatest opportunity to expand recreational fishing in the "right" waters.

PRESERVING GOOD FISH HABITAT

The biological research that brought about a change in stocking programs in streams also showed that the key to better fishing and healthier fish populations was to maintain good fish habitat.

For many years, impacts to fish habitat went unchecked. Construction crews could build dams, highways, and railroads with no consideration for the fish habitat that was lost. Gravel and other minerals could be mined from the beds of flowing streams. Nearly anything could be dumped into streams, and they could be completely dewatered because no legal provisions existed to leave water instream for fish. The only way a water right could be established was to divert water from the stream.

The first step forward was passage of the Montana Water Pollution Control Law in 1955, establishing a system for protecting the quality of Montana waters. Department biologists worked with Board of Health personnel to recommend standards for preserving and enhancing fishery values. Also, studies conducted in the mid-1950s by department biologists in cooperation with the U.S. Forest Service first revealed how harmful spraying DDT was to aquatic systems. Rachel Carson later cited these studies in her book, "Silent Spring."

In the 1950s, federal law required federal dam-building agencies to request department recommendations, although they were under no obligation to implement them. This, in part, led to an effort to define the comparative values of Montana streams so the best examples could be protected.

A state highway map at the time boasted 32,000 miles of good fishing streams—so what's another 30 miles here or there lost? Biologists from the department, Montana State College (now Montana State University), and the U.S. Fish and Wildlife Service developed the nation's first stream rating map in 1958. The system was designed to pick out the cream of the crop—the "blue ribbon" streams. The system identified 410 miles of streams such as the upper Yellowstone and Big Hole rivers.

Nearly 30 years later, that same system became the foundation for the Pacific Northwest Rivers project. Funded by the Bonneville Power Administration, the effort classified streams in Washington, Oregon, Idaho, and Montana. Its purpose was to direct hydropower development to less sensitive areas and protect important streams from future development. Based on high fish and wildlife values, in 1988, the Northwest Power Planning Council voted to establish protected areas on thousands of miles of streams in those four states, including 2,168 miles in western Montana.

Initiation of the federal interstate highway system in the late 1950s also presented a challenge. It was more difficult for the public to understand how straightening and riprapping stream channels translated into significant loss of fish habitat. Also many of the changes occurred in only short stream reaches, but, in total, many miles of stream were affected.

A 1954 study at Montana State College confirmed the loss of 58% of trout due to removal of streamside brush and a 33% loss due to elimination of undercut banks in one Gallatin Valley stream. In 1962, department biologists surveyed 13 streams in the state. They found that over one-third of the

continued on page 29

Three New Commissioners, One New Director

The advent of Montana's new administration in January 1989 signaled the arrival of three new members to the Montana Fish and Game Commission and a new director for the Department of Fish, Wildlife and Parks.

In one of his first moves as Montana's new governor, Stan Stephens appointed Errol Galt as chairman of the commission. Galt, 33, manages the family-owned 71 Ranch near Martinsdale. He is a fly-fisherman and waterfowl hunter. Galt took over the chairmanship from Bob Jensen, Circle, who remains on the commission.

Also joining the commission are Greg Barkus of Kalispell and William Stratton, Billings.

Barkus, 43, is vice president of D.A. Davidson investment firm. He is also vice president of the recently formed Kalispell chapter of Pheasants Forever and has been active in Ducks Unlimited, an international waterfowl conservation organization. Barkus replaces James Olsen, a Hamilton dentist, on the commission.

Stratton, 52, lives on a farm east of Billings and operates a family-owned dryland farm southwest of Billings. He is general manager of the Power Transmission Equipment Company. For the past eight years, Stratton has been active in Safari Club International, a worldwide wildlife conservation organization; he is a current board member and past president of the organization's Montana chapter. He replaces Don Bailey, a Colstrip rancher and businessman, who served eight years as the commission's southeastern district representative.

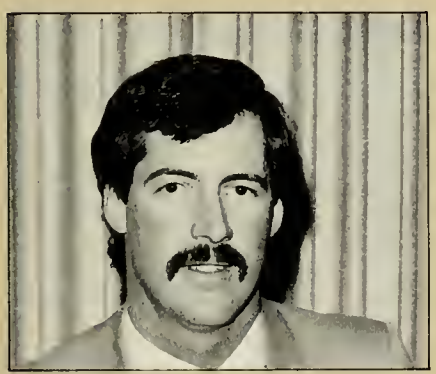
F.W. "Bill" Howell, West Yellowstone, continues as the commission representative for Montana's south central district.

* * * * *

Gov. Stephens named K.L. Cool, 42, as director of the Department of Fish, Wildlife and Parks. Cool was regional director for Ducks Unlimited in Pierre, S.D. In naming Cool, Gov. Stephens said, "Mr. Cool knows how vital the appropriate management of our wildlife, fisheries, and public land resources are to state residents and he is ready and willing to do the job."

Cool said the opportunity to work with FW&P and with the resources in Montana is "probably the greatest gift that a wildlife professional could have." He said he hopes to reduce the controversy surrounding fish and wildlife management and the state's resources. "Focusing the talent and energy of the personnel in the department will enable us to do far more for the state's

K.L. Cool



Errol Galt

Greg Barkus

F.W. Howell

Bob Jensen

William Stratton

resources," he said.

Cool received a bachelor's degree in wildlife management and a master's degree in wildlife biology from South Dakota State University, Brookings. He began his career with the South Dakota Game, Fish and Parks Department as a game warden. He worked as a research biologist and special assistant to the secretary of the department before becoming director of the Wildlife Division 10 years ago. He served in that post until 1985, when he joined Ducks Unlimited.

In 1977, Cool received the "Governor's Award" as "Conservationist of the Year" from the South Dakota and National Wildlife federations.

Cool replaces Jim Flynn who had served as director since 1981.

Bighorn Auction— A Million-Dollar Deal

You'll get no argument from sportsmen and women all over the country: Bighorn hunting in Montana is a million-dollar experience. Montana's bighorns are the magnificent denizens of incredibly beautiful country, and more Boone and Crockett trophy rams have been taken in Montana than from any other Rocky Mountain state.

The number of people wanting to try their luck greatly outdistances the number of permits available. For example, in 1988, the latest year for which figures are available, 10,068 hunters applied for 132 permits (rams or either-sex unlimited areas aren't included) in 23 districts. Odds of being drawn were 1 in 76.

There's a way of beating those odds—and bighorn sheep and big game hunters both come out on top. The way to the top is provided by the Foundation for North American Wild Sheep and an auction the organization sponsors.

In 1985, the Montana Legislature authorized the Fish and Game Commission to auction one bighorn sheep license each year. The law further stipulated that the money raised be used for research, management, and habitat improvement for moose and bighorn sheep.

At the foundation's first bighorn sheep permit auction in 1986, Montana's bighorn permit went for $79,000. This bid topped the previous record of $67,500 paid in 1985 for a Nevada desert bighorn sheep. The Montana winner was entitled to take a three-quarter curl or larger bighorn ram in any sheep hunting district in the state during 1986. After hunting for 16 days in western Montana, the high bidder harvested a large ram.

The high bid in 1987 was $109,000—

graphics: DIANA HAKER

an unprecedented figure in the history of special sheep license auctions. The 1988 high bid was $94,000, and the 1989 winner paid $74,000 (see his story below).

What does this mean to bighorn sheep in Montana—beyond a quality hunting experience for the high bidder? In cold hard cash, this translates into $355,000 raised. The foundation retains 10% of the bid price for auction expenses, so the account has received $319,500. Glenn Erickson, who heads the Management Bureau in the FW&P Wildlife Division, says that about 85% of the money raised has gone toward acquisition of winter range or habitat improvement. "For example," he said, "in June 1988, 65.5 acres of bighorn sheep winter range was purchased near Kootenai Falls in northwestern Montana for $200,000. The sheep auction account picked up $179,000 of that expense."

Erickson said the bighorn sheep license auction has provided a "significant boost" to Montana's bighorn sheep program. Over the last six years, revenue from bighorn sheep licenses has ranged from $60,825 to $83,950. "The addition of the auction revenue has more than doubled the funding available for the bighorn sheep management program." Erickson emphasized the money will play a key role in helping FW&P meet bighorn sheep management objectives—increasing research efforts, protecting and preserving key bighorn habitat, and transplanting bighorns into suitable, unoccupied habitat. Erickson said, "Competing land uses are increasing, and the quality and quantity of bighorn sheep habitat in Montana is decreasing. We need to learn more about the bighorns we have and protect the habitat they require."

The real winners in the auction program extend far beyond the high bidders. The real winners are the sheep and everyone who values them.—*Kay Morton Ellerhoff, associate editor*

* * * * *

• *The following was written by Guy W. Miller, Jr., of Waynesboro, Pennsylvania. He was the successful bidder on Montana's 1989 bighorn sheep permit.*—Ed.

Why would anyone spend $74,000 for a sheep permit?

As long as I can remember, my dad took me hunting. Wild ducks, squirrels, small game, and Pennsylvania whitetails were some of our favorites. Can the love of hunting be inherited? I think not, but surely it can be cultivated by a patient, loving father.

Over the years, we have had several special hunting trips—Virginia whitetail, Colorado mule deer, Montana elk, antelope, mule deer, whitetail—just to name a few.

My dad never possessed the desire to hunt sheep, but because of his inspiration, I've been blessed with that opportunity. He has provided the chance for me to succeed in business which has

allowed me the financial security to be able to hunt. (I presently have the Grand Slam!) However, the pinnacle of my sheep hunting experience thus far was the final "SOLD" bid for the Montana bighorn permit at this year's Foundation for North American Wild Sheep convention in Reno. I shall never forget the "high" of that moment.

Dad suffered a debilitating stroke five years ago, and most likely never will hunt again. But his legacy lives on as I hunt, patiently teach, and enjoy sharing hunting experiences with my own three sons and daughter.

I guess I can say, "Thanks, Dad," as I dedicate this once-in-a-lifetime hunt to you. What greater way to pay tribute to Dad than to dedicate such a prestigious hunt to him? So to my father, Guy W. Miller, Sr., let's go hunting in spirit and climax an unforgettable hunting career with a trophy Rocky Mountain bighorn. At least, let's give it our best shot.

Unusual Trophy

When Chadd Laws, a Thompson Falls teen-ager, shot an 8x8-point whitetail buck on the last day of the 1988 deer season, he was understandably

Chadd Laws

excited. The young hunter had rattled a set of deer antlers to attract the animal into shooting range. When he started to field-dress his trophy, his excitement turned to surprise.

Since he had dressed out deer and elk before, he immediately realized that something was wrong. Externally, in terms of reproductive organs, his trophy buck was a doe!

Chadd mulled over the implications of this discovery and went for help. Chadd and his father, Harold, carefully dressed out the deer and found nothing "male" about it except the well-formed antlers.

Although uncommon, antlered does are occasionally reported in Montana. The typical antlered doe sports a set of small, uneven antlers which remain in velvet or partially in velvet yearlong. Antlered does of this type are usually fertile and produce young. Antler growth is typically a result of hormone imbalance.

Chadd's "buck," however, is apparently an example of a different and exceedingly rare condition. This deer, with well-developed, polished antlers and no obvious male sex organs, probably had both male and female reproductive systems present. Technically, such animals are known as "pseudohermaphrodites." The male and female organs are poorly developed and incomplete in function and structure, and the animal is infertile both as male and female. The testes are small and lie inside the body cavity, often surrounded by fat. Enough male hormones are produced to form hard antlers which may or may not be shed.

This condition in domestic species is linked to a genetic defect. It is interesting to note that another smaller hard-antlered "doe" was killed in the same area several years ago.

Based on tooth wear, the deer was 4 1/2 years old. The antlers had an inside spread of 11 inches and a beam length of over 17 inches. Comparing measurements with other antlered does, this Montana whitetail may be the largest on record.

Dr. Bart O'Gara of the Montana Cooperative Wildlife Research Unit in Missoula provided literature on this rare condition.—*Tom Lemke, FW&P biologist, Livingston*

Wantulok Drew Eagles

We forgot to credit Jim Wantulok for drawings which showed characteristics by which one can distinguish immature bald eagles from adult golden eagles. His work appeared on page 19 of our March/April 1989 issue, as part of the article, "King of Birds."

Wantulok was a finalist in Montana's first waterfowl stamp contest in 1986. Work of the Bozeman artist has graced our pages often, and we regret the oversight.

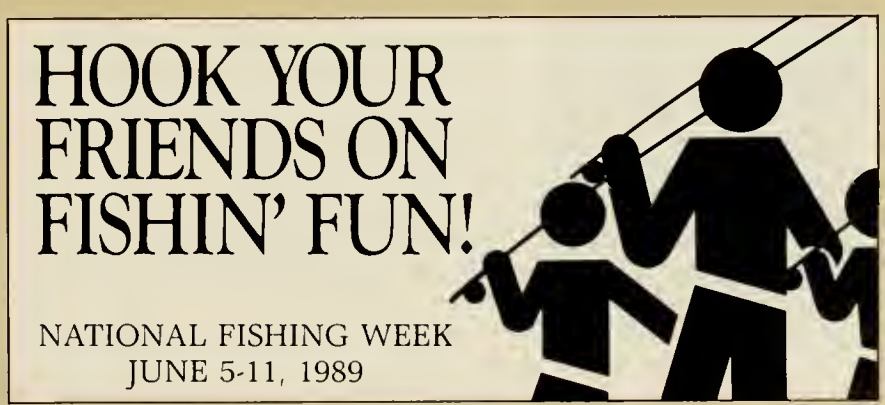
Down Home and Personal: National Fishing Week Invite

Whether you're young or old, whether you fish for rainbow trout in the Kootenai River near the mouth of Libby Creek or for sauger and sturgeon in the Tongue River beneath the old railroad bridge, or whether you fish somewhere in between—you realize the uniqueness and importance of Montana's fisheries.

In honor of the sport of fishing and the importance of the fishery resource, the Montana Department of Fish, Wildlife and Parks and the American Fisheries Society invite you to help celebrate National Fishing Week, June 5-11. All state fish hatcheries and regional offices are open for tours, and you are invited to stop in, ask questions, watch fisheries biologists work, or just visit about your favorite fishing hole.—*Mark Sweeney, FW&P fish hatchery worker, Anaconda*

Wild Rockies Classroom

Using as a classroom over 5 million acres of wilderness in the Wild Rockies Region, the University of Montana is offering the 15th annual "Wilderness



and Civilization'' Program.

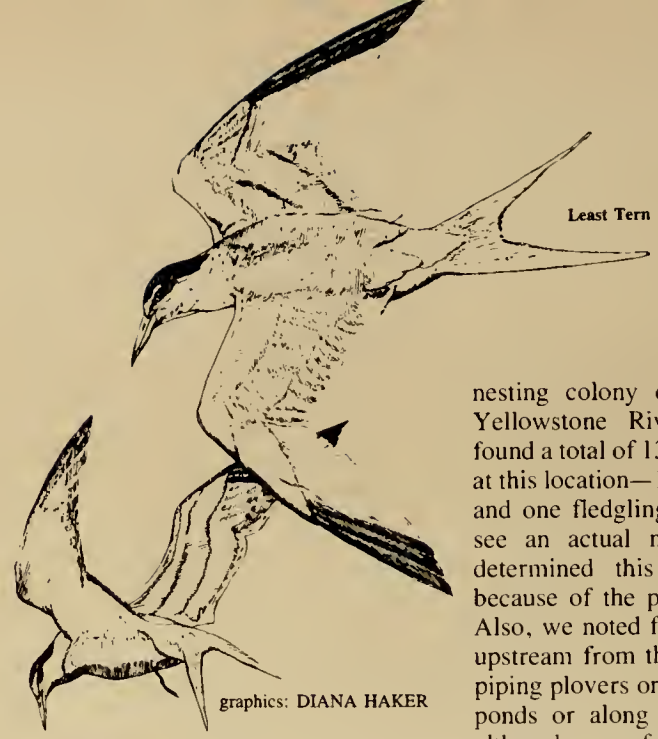
The interdisciplinary program is sponsored by the Wilderness Institute in the School of Forestry. For the first time, the course is being expanded to include two 18-credit quarters of study. By integrating sciences and the humanities, this program focuses on understanding wilderness and wildlands and their relationship to contemporary American society.

The program begins in September with a two-week backpacking trip in a western Montana wilderness area. In addition to the wilderness experience, students and faculty learn firsthand about major wilderness management problems and issues. When they return to campus, students begin two quarters of intensive readings, writings, discussions, and projects. The work brings together courses from environmental studies, English literature, economics, forestry, humanities, philosophy, religious studies, drama, recreation, and wildlife biology. The program ends in March with another two-week wilderness trip.

Enrollment is limited to 32. For further information, contact the Wilderness Institute, School of Forestry, University of Montana; Missoula, MT 59812.

Least Terns Spotted In Southeastern Montana

The least tern (*Sterna antillarum*), a delicate white sea bird, was federally listed as an endangered species in Montana on May 28, 1985. In 1986 and '87, least terns were located on Fort Peck Reservoir, but no successful nesting was documented. As a result of the federal listing and findings from more intense surveys in northeastern Montana, the Bureau of Land Management (BLM) in Miles City expanded survey efforts for the least tern (and also for piping plovers, *Charadrius melodus*, a threatened species in Montana) into previously unsurveyed areas in southeastern Montana.



graphics: DIANA HAKER

The survey was conducted from May 17-July 7, 1988, along the Yellowstone River, from Bighorn to Sidney. The crew also inventoried 43 upland saline ponds in central and southern regions of eastern Montana, primarily for piping plovers. The many long, hot hours of searching finally paid off in the final week of the survey. We located one nesting colony of least terns on the Yellowstone River near Terry. We found a total of 13 least terns at one time at this location—11 adults, one juvenile, and one fledgling. Although we didn't see an actual nest or nest site, we determined this was a nesting site because of the presence of the young. Also, we noted feeding adults one mile upstream from the colony. We saw no piping plovers or other least terns at the ponds or along the rest of the river, although we found and inventoried potential habitat.

Keep your eyes open right about now—you could be treated to a rare sighting of this smallest member of the tern species.—*Sarah B. Hall, Bear Springs Ranger Station; Maupin, Oregon (formerly with BLM, Miles City)*

Two Fish Pros Honored

The Fisheries Division of the Department of Fish, Wildlife and Parks presented its top annual professional awards for 1988 to biologists Dick Vincent and Mark Gaub. The awards were presented at an annual training session in Helena.

Vincent, fisheries manager for FW&P's Bozeman-based southwestern region, was named ''Professional of the Year'' for his contribution to protection and enhancement of the state's wild trout fisheries. Vincent's contributions include design of electrofishing systems, nationally recognized research on the Madison River, and his recent efforts to develop wild trout fisheries in southwestern Montana reservoirs.

Gaub, a fish culturist at FW&P's Yellowstone River Trout Hatchery in Big Timber, was named ''Technician of the Year.'' His accomplishments include development of sampling techniques to capture and quantify emerging fry, publication of a professional paper in the *North American Journal of Fisheries Management*, and development of a computer graphics program for use in analyzing hatchery data.

Clutter Got You Behind the Old Eight Ball???

Stack 'em up in a MONTANA OUTDOORS binder—and start all over with a clean slate.

One binder holds six issues. To order yours, send $6 (includes postage) to: MONTANA OUTDOORS, Department of Fish, Wildlife and Parks, 930 Custer Avenue West; Helena, MT 59620.

Insects, amphibians, small mammals, and birds—like the cedar waxwing shown here—make up the diet of northern pygmy-owls.

GLARING GNOME

by Denver W. Holt and Rick Kline
photos by Rick Kline

PERCHED ON A LOW LIMB, the little owl waited patiently for the juncos to resume feeding. With a quick spring from the branch, the owl launched a slow, calculated glide, extending its feet forward at the last moment. Sensing danger, the juncos scattered to safety in the nearby bushes and trees, and the owl's talons closed on empty air. There was a thump—but not a bad one—as the owl hit the ground, using its feet, wings, and tail to soften the impact. Regaining its balance, the pygmy-owl fluttered back to its perch.

Officially named the northern pygmy-owl *(Glaucidium gnoma),* this diminutive Montana owl measures only six to seven inches from the top of its head to the tip of its tail and weighs two to three ounces—about the same as a butter knife. Females are slightly larger than males, but the distinction is impossible to make unless a male and female are perched side by side. When sitting on a limb or power line, the pygmy-owl appears as a small, plump bird with a long, thin tail. The flight pattern consists of several wing flaps alternated with short, sinking glides, much like the flight pattern of woodpeckers and shrikes.

In addition to its small size, the northern pygmy-owl has several key markings which aid in its identification.

The head is small, rounded, and covered with numerous tiny, white spots. The eyebrows are white and distinctive, the eyes small and yellow. The bill is usually dull yellow but can be yellow-green, yellow-black, or yellow-white. The throat and neck are mottled brownish-white giving way to a whitish chest, belly, and sides; conspicuous brown streaks run lengthwise down the front of the body. The back is generally gray with fine, white spotting.

The back of the head has a pair of markings that resemble eyes. These oval-shaped "false eyes," which have black centers surrounded by whitish borders, meet at a slight slant at the center of the head. It sometimes appears that the black centers have faint white pupils, an effect that could be caused by lighting or feather arrangement—it is difficult to tell. Biologists theorize that the false eyes deter small birds from attacking the owl from behind.

Although pygmy-owls do not have prominent ear tufts or "horns" like many other owls, they do have small ear tufts which they raise when alarmed.

THERE ARE 15 SPECIES of pygmy-owls in the world. They are found in northern Europe, the western United States, Mexico, Central and South America, Africa, Asia, and Indonesia. These owls occupy a wide variety of habitats, including boreal forests, mixed forests, tropical forests, damp-deciduous forests, wooded river valleys, cactus and scrub deserts, and savannas.

In North America there are two species, the northern pygmy-owl and the ferruginous pygmy-owl. The northern pygmy-owl is widely distributed, ranging from northern British Columbia south to Mexico, and from the Pacific Coast to the east side of the Rocky Mountains. The ferruginous pygmy-owl has a restricted range in the United States, occurring only near the Mexican border in southern Arizona and southeastern Texas.

In Montana, northern pygmy-owls are most common in the western mountains, although they may be found in some of the isolated mountain ranges in the central part of the state. In western Montana, these owls are most often observed in mixed Douglas-fir forests, but can also be found in cottonwood stands along rivers.

Little is known about pygmy-owl breeding biology, although the breeding season probably begins some time in March. The courtship call is a short "toot (pause) toot," given at two- to three-second intervals, then a long pause and a repeat of the "toot (pause) toot" call. Although it is a courtship call in spring, a toot call can be heard any time of year. Northern pygmy-owls nest primarily in abandoned woodpecker holes. The male owl sits in the hole's entrance and gives the courtship call, trying to attract a mate. The female apparently decides whether the hole is an acceptable nesting site or not.

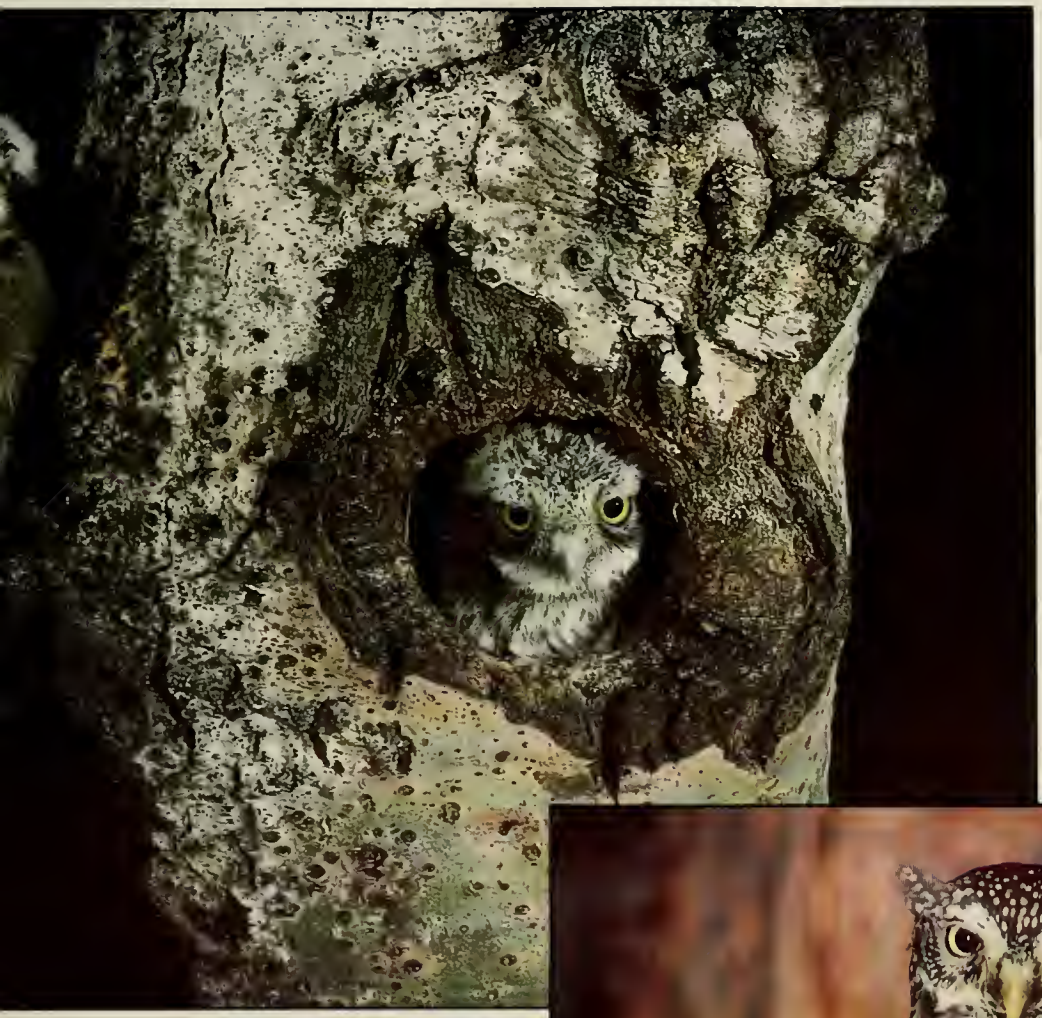
The three or four eggs customarily laid by the female pygmy-owl hatch simultaneously, or nearly so. During the time the female is incubating the eggs and brooding her young, the male does all the hunting. When the male brings food to the female at the nest hole, he flies to a perch in front of the nest and calls to her with the distinctive two-note call. The female flies to him, takes the prey, and either eats it or returns to the nest to feed her young. The male then resumes hunting.

The female starts leaving the nest to hunt when the nestlings are approximately two weeks old, and she and the male continue to provide food for the nestlings. The nestlings are ready to fledge in approximately 30 days. Lack of room in the nest hole may contribute to the nestlings' eventual decision to climb out. At this time they resemble adults, but lack the spotted head, yellowish bill, and long tail; they also often retain downy feathers around the top of the head.

LITTLE INFORMATION is available on the activities of young northern pygmy-owls after they leave the nest. How far do they travel? How long do the adults feed them? When does the family unit separate? Future studies may perhaps help answer these questions.

Northern pygmy-owls become more conspicuous during winter throughout western Montana for two reasons: (1) Many deciduous trees and shrubs have shed their foliage and much of the forest undergrowth has died back, making the owls more visible, and (2) many of the owls begin to frequent bird feeders and consequently are more easily observed. More than one pygmy-owl has met its fate or injured itself crashing into a window while chasing birds at a feeder.

Northern pygmy-owls are often seen perched "shrikelike" on shrubs, trees, or power lines in search of small birds or mammals. They are primarily daylight hunters, preferring early morning and early evening for their food-gathering forays—a schedule that coincides with the most active periods of many small birds and mammals. They eat a wide variety of prey, including insects and amphibians. They have been



Nestling pygmy-owls (left) look similar to adults, but often retain downy feathers around the top of the head. Adult pygmy-owls have small ear tufts which they raise when alarmed.

reported to take nestlings from the nest holes of woodpeckers and other cavity-nesting birds, feeding them to their own nestlings. They prefer birds and mammals the size of chickadees, juncos, nuthatches, mice, shrews, and voles, although on rare occasion they may take birds as large as robins or northern flickers and mammals as big as red squirrels.

Because the northern pygmy-owl appears to be very common and widespread throughout western North America, specific guidelines for its management are non-existent. Despite its relative abundance, this owl's biology and ecology are not well known; the authors would welcome information and observations concerning nesting habits, food habits, and other aspects of this unique predator's life history. Correspondence can be addressed to the authors at the Owl Research Institute, P.O. Box 8335; Missoula, MT 59807.■

Three from the Centennial

story and photos by Marco Restani

TUCKED AWAY in the extreme southwestern corner of Montana, the Centennial Valley contains unique and important habitat for a variety of wildlife. Forty miles long and seven miles wide, this high valley is sparsely populated and remote. With only a few gravel roads to provide access, it is one of Montana's best-kept secrets.

Bordered on the north by the foothills of the Gravelly Range and on the south by the avalanche-swept crags of the Centennial Mountains, the valley floor rests at an elevation of 6,600 feet. Winter comes early to the valley and snowmelt does not begin until late April. The roads are not passable during winter, and travel is restricted to snow machines. With few exceptions, the only winter residents of the valley are the staff and families of the Red Rock Lakes National Wildlife Refuge (NWR).

Red Rock Lakes NWR occupies the eastern third of the valley. Established in 1935 to protect the trumpeter swan, the refuge provides important habitat for many species of waterfowl and big game animals, especially moose. The remaining valley floor to the west of the refuge is a mixture of grassland, sagebrush, and streams bordered by willows. This area, used primarily for cattle grazing by local ranchers, is home to hundreds of hawks.

The raptor community of the Centennial Valley is large and diverse, with hawks, eagles, and owls all well represented. Both bald and golden eagles nest in the valley. Through a vigorous reintroduction program, the endangered peregrine falcon has once again established itself as a breeder in the valley—in 1988, two pairs raised a total of seven young. One pair occupied an old tower near Lima Reservoir, while the other nested on a cliff in the Centennial Mountains overlooking the refuge. Great horned, great gray, and long-eared owls inhabit the wooded slopes bordering the valley. Occasionally one may spot a burrowing owl perched on a badger's diggings. But the most numerous and obvious raptors in the valley are those in the genus *Buteo*—the soaring hawks.

HAWKS IN THIS GENUS have robust bodies, long, rounded wings suited for soaring, and fanned tails. Most buteos have extremely variable plumage coloration, from white (albinistic) to black (melanistic). White individuals are rare. The two intermediate color phases, light and dark, are typically observed. During summer, they are commonly seen circling on rising air currents (thermals). Three species of buteos nest in the Centennial Valley: the red-tailed, ferruginous, and Swainson's hawks.

Although the redtail is the least abundant buteo in the valley, it is the most widespread and common buteo in North America, being absent only in the high Arctic. Redtails migrate to the Gulf Coast and as far south as Nicaragua during winter, although a few individuals overwinter in Montana. As its name implies, the adult redtail's most obvious field mark is its russet tail; immature birds, which have plumages differing from adults, have brown barred tails and more brown streaking over the rest of their bodies. Although coloration varies widely, most adult birds have dark brown heads and backs with white bellies and underwings. The light undersurface contrasts with a brown belly band and dark wing edges (see the Nov./Dec. 1987 *Montana Outdoors* for a detailed guide to identification of Montana's birds of prey).

The ferruginous hawk is the largest North American buteo; its name, derived from the Latin *ferrugo*, meaning rust, refers to the bird's rufous color. It has the most restricted range of all buteos. In Montana it is a common breeder only in the Centennial Valley, along the Hi-Line in northern Montana, and in the extreme southeastern portion of the state in Carter County. Population declines throughout most of its range in Montana have made this hawk a "species of special concern" in the state. Ferruginous hawks winter in the southwestern U.S. and Mexico. Light-phase individuals have dark brown backs with rufous-colored feather edges. The entire undersurface is white with the exception of dark-colored legs that contrast with the white belly to form a noticeable "V" in flight. The tail is white, although a light rusty wash may be present on the upper surface. Immatures look like adults but lack the striking rusty appearance and the dark-colored legs.

The Swainson's hawk, named after the 19th-century English naturalist William Swainson, is the most common buteo in the Centennial Valley. It breeds across the entire western U.S. and Canada, and with the arrival of autumn it makes one of the longest migrations known among birds of prey. Almost all individuals winter on the pampas of Argentina, an incredible 6,000 miles from the Centennial Valley. Light-phase adults have dark brown backs and wings. The white undersurface of the body contrasts with the chestnut-colored bib and dark flight feathers of the wings. The tail, which is dark brown above and white below, is striped with thin, black bands. Dark-phase individuals appear all brown except for the tail pattern. Both color

Young ferruginous hawk

phases are common in the Centennial Valley. Immature birds show heavy streaking and do not acquire adult plumage for two years, unlike immature red-tailed and ferruginous hawks, which assume adult plumage after one year.

BECAUSE THESE CLOSELY RELATED HAWKS all occur in abundance in the valley, the possibility of interspecific competition exists. To determine how the three species coexist—i.e., how they use potentially limiting resources such as food and nesting sites—I began a two-year study in the western portion of the Centennial Valley in 1987. Funding was provided by the Conservation Endowment Fund, the Montana Agricultural Experiment Station, and the Montana Nongame Program.

Along with the April thaw and the re-emergence of ground squirrels, the hawks begin to arrive in the valley after a long winter. Red-tailed and ferruginous hawks arrive first, followed a short time later by Swainson's hawks. It is at this time that one is likely to witness the courtship flights of breeding adults. Buteos become sexually mature at two to three years. Soaring together, a pair will climb high into the sky. The male will then descend toward the female with his feet dangling, sometimes touching her back. These flights are often accompanied by piercing screams, perhaps to alert potential intruders to the current occupancy of the territory.

Territories normally contain more than one nest. This seems to be insurance against a single nest being blown out of a tree or usurped by owls, which begin to breed in late winter. A nest destroyed early in the season may give the adults enough time to switch to another site for a re-nesting attempt. Alternating nests from year to year also helps reduce exposure to parasites such as ticks and mites that are brought to the nest on prey species.

Twenty red-tailed hawk nests were located during the two-year study. Thirteen were found in aspen clumps at the heads of drainages, several were found

Although red-tailed hawks (above) are the most common buteos in North America, Swainson's hawks (right) outnumber them in the Centennial Valley.

This immature ferruginous hawk was fitted with a radio transmitter so that its movements and behavior could be monitored.

in willows, and a few were found in Douglas-fir trees. Nests were two to three feet in diameter and constructed of materials close at hand, primarily aspen and sagebrush twigs. The bowl was always lined with fresh aspen sprigs or sagebrush bark.

Of the 24 ferruginous hawk nests found, 17 were in willows growing along small streams. Three nests were built in lone Douglas-firs, and one was on top of a telephone pole nesting platform originally intended to attract ospreys. Since ferruginous hawks are often found in treeless areas, they appear to be comfortable nesting on the ground or on rock outcrops. However, only three such sites were found in the study area. When trees are available, they seem to be preferred, probably because they offer added security from ground predators such as coyotes. All ferruginous hawk nest sites had one common characteristic—a commanding view of the hunting area. These hawks build eagle-sized nests, which can be as large as 15 feet in height. In the Centennial Valley, nests are constructed almost exclusively of sagebrush twigs, with sagebrush and willow bark for lining. Oddly, cow chips are often found in the bowl, although their exact function is unknown.

Swainson's hawks nested in the narrowest range of habitats. Forty-one of the 42 nests found were craftily hidden in willows. The remaining nest was built in a Douglas-fir. These nests were slightly smaller than those of redtails and less sturdily built. The bases were made of willow and sagebrush branches and the bowls were lined with strips of bark.

EGG LAYING BEGAN IN EARLY MAY for both red-tailed and ferruginous hawks, while Swainson's hawks began their nesting cycle a full three weeks later. Eggs were generally laid every other day, and because they were incubated immediately, they hatched at different times. Called asynchronous hatching, this phenomenon possibly allows for adjustment of family size to the availability of prey. When times are lean, the youngest nestlings, being smaller and less competitive, may be killed by siblings or die of starvation in the nest, ensuring that at least some of the young will be strong enough to survive. Incubation lasts a little over a month; although both adults incubate the eggs, the female does the majority of the work. The young leave the nest (fledge) approximately seven weeks after the eggs hatch.

Redtails normally lay two to four eggs, but typically only two or three hatch. For the first two weeks, the young are very small and helpless. At this stage, the female broods them almost constantly. Eating food provided by the male, the young hawks grow quickly and soon peer curiously from the nest. Some time in mid-July the nestling redtails begin exercising their wings in anticipation of flight, and soon afterward the maiden flight is made.

The nesting cycle of ferruginous hawks was similar to that of redtails, but the average fledging date was somewhat later. Clutch size varied from one to five in the study area, but three was average. These hawks fledged the most young per nest of the three species studied.

Swainson's hawks laid an average of two eggs per nest in late May. Consequently, the young fledged three weeks later than red-tailed and ferruginous nestlings, sometime in late July and early August.

In an attempt to quantify and describe post-fledging movements and habitat use, in 1988 I fitted seven young hawks—two redtails, two Swainson's, and three ferruginous—with radio transmitters, just before the expected fledging date. The birds were also measured to determine sex and banded. These birds remained close to the nest after fledging, and could easily be observed sitting in open areas or on conspicuous rock perches. Siblings tended to stay in close proximity.

Both parents continued to provide food and protection to their young. If I approached too closely, the adult female would dive vigorously in an attempt to ward me off. Two to three weeks after fledging, the young became proficient fliers. They were sometimes seen in groups performing aerial acro-

batics, honing skills for their future predatory lifestyle, and any lingering traces of awkwardness soon disappeared.

About mid-August, the young birds leave adult home ranges and assume independence. It is during this time that the greatest mortality takes place, mostly due to starvation, predation, and exposure to the elements. Coyotes and foxes will quickly dispatch a sleeping hawk perched on the ground. Great horned owls also kill young buteos. Accidents, such as collisions with cars and electrocutions, take their toll. In 1987, two recently fledged ferruginous hawks in my study area were shot. Although this type of illegal activity is becoming less common, it shows that not everyone understands the beneficial role hawks play in controlling rodents.

Ferruginous hawk nests in the Centennial Valley, like the one pictured here, were most often located in willows and constructed of sagebrush twigs.

LIKE MOST PREDATORS, hawks are opportunistic hunters. They eat their prey whole or in large chunks, swallowing fur, feathers, and bones. This indigestible material is regurgitated in the form of pellets. By identifying the remains in pellets collected at nest and perch sites, one can determine which prey species constitute the majority of the diet. A fairly accurate picture of the food habits of a hawk can be developed by combining pellet analysis with prey species found in the nest and by watching adults make kills.

Buteos are primarily rodent hunters. These beneficial hawks eat literally thousands of ground squirrels in the valley, many more than any rancher could ever shoot in a season. In fact, the three hawk species in my study area subsisted primarily on ground squirrels. The diet of ferruginous hawks in my study was 85% mammals and the remainder birds. Both red-tailed and Swainson's hawks ate fewer mammals, but made up the difference by killing more birds. Small birds killed by hawks included meadowlarks, starlings, sparrows, and flickers. Radio-tagged adult hawks concentrated their hunting on the valley floor, foraging primarily in the morning and late afternoon. They captured prey both by diving from great heights or a perch and by pursuing prey from low, flapping flights.

Ground squirrels were most abundant during the breeding cycles of red-tailed and ferruginous hawks. With the onset of warmer weather, these squirrels began to estivate (remain in their burrows in a dormant state), and thus were less available during the breeding cycle of the later-nesting Swainson's hawks. As a result, Swainson's hawks killed fewer ground squirrels but compensated by taking more voles.

In the Centennial Valley, buteos use the available resources in a way that allows them to coexist. To a large extent, the three species select different nest sites. Where nest sites are similar, the timing of the breeding cycle reduces the potential for competition. Ground squirrels are the major prey for each hawk species, although Swainson's hawks kill fewer than red-tailed and ferruginous hawks. Because these squirrels are so abundant, it is doubtful that prey populations act as a limiting resource. Thus, if adequate habitat can be preserved and human disturbance minimized, the three species of buteos nesting in the Centennial Valley should continue to breed successfully. ■

READERS RESPOND

Old Buzzard

Ever since reading the Nov./Dec. 1987 issue featuring Montana's birds of prey, I resolved to someday locate and print a photo negative—from about 53 years ago—that I knew I had taken of a turkey vulture killed by striking an automobile windshield.

It is my guess that more than a few of your readers were surprised to learn that Montana is inhabited by these birds.

Probably just as surprised as most local people were when I drove about three-quarters of a mile out of Hinsdale to pick up a bird my father said he had struck, shattering the windshield. An old-timer, originally from Texas, identified the bird as a "turkey buzzard" and stated he had seen many in Texas, but it was the first time in his years in Montana he had seen one.

The print is of fair quality, considering it was made with a $12.50 Jiffy Kodak snapshot camera. The broken windshield on the 1935 Ford is shown, as are the small head and turkeylike feet. My father was a notoriously fast driver—he had a two-speed Columbia rear axle in this Ford so it would go faster, which probably contributed to the bird's demise. He said the turkey vulture had been feeding on a rabbit carcass on the highway.—*R.E. Hillman, Hinsdale*

What a Year!

I'm 14 years old and live in Glendive, Montana. I'm writing to tell you about the year I had hunting and fishing with my dad in Montana.

I caught two paddlefish last May at Intake. My father and I hunted antelope near Fort Peck and shot one that scored 78. In November, I shot my first deer and my first goose on the same day, near Terry.

This May, my father and I are planning to go bear hunting near Libby. I can hardly wait.

What a year! I know I'm lucky to have a dad who takes me hunting and fishing, and I'm lucky to live in Montana. There can't be another place like it.—*Brock Barney, Glendive*

Painting on Fire?

After hearing of the many forest fires out West last summer, I couldn't help but see "fire" in Dave Samuelson's bull elk painting on the back cover of your Sept./Oct. 1988 issue. Does it really exist there in the painting?

Any comments on how wildlife is being affected by these fires?—*L. Spiracos; Venice, Florida*

• *We're planning an in-depth look at the effects of fires and drought on fish and wildlife in an upcoming issue.*—Ed.

More on the Smith

I could tell by the title, "Revisiting the Smith," (*Montana Outdoors*, March/April 1989) that part of the management plan for the Smith would include permits, and it didn't take long to verify this in the text. I realize that the Smith may indeed require some management to retain its wilderness and recreational values; however, I take strong exception to including "outfitter allocation" in the management. The Smith is probably one of the truly outstanding float trips left in the lower 48 that (1) is accessible to the average recreationist, (2) doesn't require exceptional boating skill (in other words, does not take experience in Class IV or V water to run it), (3) is not overrun with outfitters, and (4) has excellent fishing.

If you must go to a permit system, please remove the outfitter allocation and make outfitters play the same reservation or lottery system as the ordinary citizen. Better yet, establish an initial period for reservations for private parties only. If any slots go unbooked, allow outfitters to put in for the remaining slots.

Do not relegate the Smith to the status of other outstanding rivers so stuffed with outfitters that ordinary floaters are left out (again). If anything, reserve it for the people who have a feeling for wilderness rivers, are resourceful enough to pilot a boat on it, and have no motivation other than the wilderness experience.

Restricting outfitters will not prevent people from making a Smith River trip (you may have heard claims that some people would not be able to make the trip without an outfitter). There are good roads leading to the put-in and take-out points, the river itself doesn't require exceptional boating skills, and there is no point on the river itself where it is impossible to get out. The river is

no more isolated than the Missouri, which I have run from Coal Banks landing to the Judith. I lived for several years in central Montana, and got to know the Little and Big Belt mountains fairly well.

I've received your magazine for years, and it is an accurate reflection of a truly outstanding state, an exceptional people, and a conscientious Department of Fish, Wildlife and Parks. I've lived in Colorado, Utah, and Alaska since leaving Montana in 1980, and there is no more beautiful area on the entire continent. Please reserve a sterling part of your state for your private citizens. They deserve it.—*Curt McEwan, Elmendorf Air Force Base, Alaska*

• Montana Outdoors *Editor Dave Books forwarded your letter about the Smith River to me.*

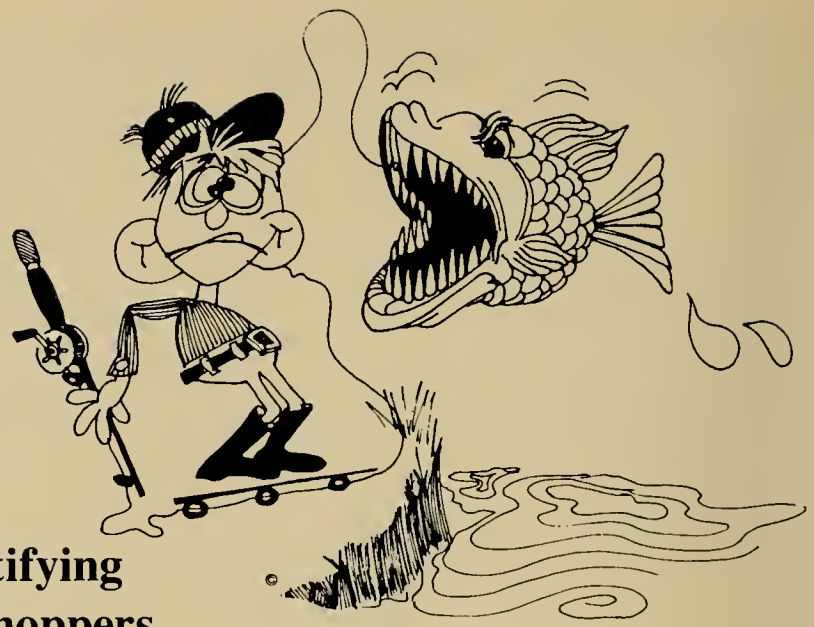
Thank you for your support for preserving this outstanding place and for your concern that private citizens continue to have an opportunity to enjoy it.

Our information shows that not all private citizens who want to float the Smith River have the proper equipment or confidence to tackle the trip without professional help. Some simply prefer to spend their time enjoying the rest, the solitude, and the beauty of the Smith without having to worry about equipment, camp chores, food, and other details. We feel these people should have the opportunity to share this resource.

On the other hand, we do not envision ever having a system where all or even a majority of the recreational opportunities on the Smith will be allocated to outfitters. Instead, an allocation based in some way on historic use and a public hearing process would be used.

We hope to postpone the day when mandatory regulation of river use will be necessary. The five-step management plan briefly outlined in Montana Outdoors *is designed to deal with increasing user pressure, using limited measured response with mandatory allocation of all use as the last step. We are currently at Step 1, which is an entirely voluntary system.*

We agree that private citizens deserve the opportunity to enjoy the Smith without using commercial outfitters. Their rights will be protected. But we also feel that persons who prefer to use the services of an outfitter should have that option available to them.—Don Hyyppa, administrator, Parks Division



Certifying Whoppers

Three fell. One was tied. One from 1987 was officially recorded. And a "new" name was added. Such was the whopper certification process for 1988.

Records for golden trout, longnose sucker, and yellow perch were broken. In all three cases, the preceding records were only a year old—they were set in 1987. But what's unusual about the yellow perch record is that Vernon Schmid broke his own 1987 record. He caught both of the fish in Ashley Lake and both of them then made trips to the taxidermist. The 1988 record weighed 2.37 pounds, topping the previous record of 2.08 pounds. Schmid, a retired lumberjack who lives in Kalispell, caught the record-breaking perch on a pan fish hook with a maggot.

Lightning Lake was the home of both the 1987 and '88 record golden trout. Jack T. Robertson of Bozeman broke the previous record of 3.58 pounds with his 4-pound, 1-ounce golden.

Ray Quigley of Great Falls, whose name has appeared often on Montana's record fish list, added yet another pacesetter with his 3.27-pound longnose sucker. He caught it on the Marias River at Loma; the preceding record weighed 3.09 pounds and it was taken on the Missouri River near Virgelle.

As amazing as it may seem, Tom Hilderman, Miles City, tied Gordon Wentworth's 1984 record channel catfish—25.89 pounds. Hilderman caught his 1988 record channel cat at Hell Creek Bay on Fort Peck Reservoir; Wentworth's also came from the reservoir.

On June 20, 1987, Richard C. Lee of Glasgow caught a 20-pound, 7-ounce freshwater drum in the Big Dry Arm area of Fort Peck Reservoir. His drum broke the 1985 record of 17.55 pounds, also caught at Fort Peck Reservoir. Lee's record was not brought to our attention, so it didn't appear on our 1987 list.

Larry Garrow's cisco may not be big—1.28 pounds—but it enabled him and the cisco to become "the new kids on the block" of Montana's 1988 record fish. Garrow, who lives in Cut Bank, caught the cisco at Fort Peck Reservoir.

How do you go about certifying whoppers? First, you must catch the fish legally. Second, your fish should be weighed before witnesses on a government-inspected scale, such as those found in most grocery stores. Weigh the fish as soon as possible after catching it. Fish can lose precious ounces—ounces that can spell the difference between a record-breaker and an also-ran. Third, the fish must be positively identified, preferably by a Department of Fish, Wildlife and Parks employee. It's also a good idea to take color photographs of the fish to help solve any identification problems.

As you load up your fishing gear for a day on the water, think of this: Three of the certified whoppers on the 1987 list were erased in 1988. Good luck in certifying your whoppers in 1989.—*Kay Morton Ellerhoff, associate editor*

Species	Weight lbs.	ozs.	Angler	Year	Location
Arctic grayling	2	10½	Steve Houser	1986	Hyalite Reservoir
Bigmouth buffalo	32	6	Gary Lundman	1979	Missouri River (Slippery Ann Game Station)
Black bullhead	1	11	Mike Mitchell	1977	Horse Creek (McCone Co.)
Black crappie	3	2	Al Elser	1973	Tongue River Reservoir
Blue sucker	7	4	Dudley L. Thiel	1986	Yellowstone River (near Sidney)
Bluegill	2.64		Brent Fladmo	1983	Peterson's Stock Dam
Brook trout	9	1	John R. Cook	1940	Lower Two Medicine Lake
Brown trout	29	0	E.H. "Peck" Bacon	1966	Wade Lake
Bull trout	25	10	James Hyer	1916	unknown
Burbot (ling)	13	4	Paul Keller, Ernie Schutt	1980	Missouri River (below Fort Peck Dam)
Carp	38	8	Don Bagley	1986	Eyraud Lakes
Channel catfish**	**25.89**		Gordon Wentworth, **Tom Hilderman (tie)**	1984 **1988**	**Fort Peck Reservoir**
Chinook (king salmon)	7	11	Joyce Good	1987	McGuire Creek
Cisco***	**1.28**		**Larry Garrow**	**1988**	**Fort Peck Reservoir**
Coho salmon	4	14	Irven Stohl	1973	Fort Peck Reservoir
Cutthroat trout	16	0	William D. Sands	1955	Red Eagle Lake
Freshwater drum*	**20**	**7**	**Richard C. Lee**	**1987**	**Fort Peck Reservoir**
Golden trout**	**4**	**1**	**Jack T. Robertson**	**1988**	**Lightning Lake**
Goldeye	2	9	Lester Estenson	1977	Nelson Reservoir
Kokanee (salmon)	5	15	Forrest Johnson	1976	Pishkun Reservoir
Lake trout	42	0	Dave Larson	1979	Flathead Lake (east shore)
Lake whitefish	10	0	Ruby Mutch	1986	Lower St. Mary Lake
Largemouth bass	8	2½	Juanita A. Fanning	1984	Milnor Lake
Longnose sucker**	**3.27**		**Ray Quigley**	**1988**	**Marias River**
Mountain whitefish	5	1½	Mervin "Frog" Fenimore	1987	Kootenai River
Northern pike	37	8	Lance Moyler	1972	Tongue River Reservoir
Northern squawfish	7.25		Loyal Herreid	1987	Lower Flathead River
Paddlefish	142	8	Larry Branstetter	1973	Missouri River
Pallid sturgeon	60	0	Gene Sattler	1979	Yellowstone River
Pumpkinseed	0.95		Tim Colver	1985	Milnor Lake
Pygmy whitefish	0.16		Orlin Iverson	1982	Ashley Lake
Rainbow trout	20	0	C.J. Brohaugh	1952	Cliff Lake
Rainbow-cutthroat hybrid	30	4	Pat Kelly	1982	Ashley Lake
Sauger	7	2	Raymond V. Johnston	1975	Tongue River Reservoir
Shorthead redhorse sucker	4.68		Ray Quigley	1985	Marias River near Loma
Shortnose gar	3	1	John Johnson	1977	Fort Peck dredge cuts
Shovelnose sturgeon	13.72		Sidney L. Storm	1986	Missouri River
Smallmouth bass	5.11		Marvin Loomis	1987	Fort Peck Reservoir
Smallmouth buffalo	9	4	Mac McKinney	1977	Hauser Lake (west side)
Stonecat	0.42		Robert M. Garwood	1985	Milk River at Havre
Utah chub	1.43		M. Steve Kovatch	1986	Canyon Ferry Reservoir
Walleye	14	0	Neil Berg, Jim Carver (tie)	1974 1983	Nelson Reservoir
White bass	1	2	Ludwig Dubbe	1986	Fort Peck dredge cuts
White crappie	2	2	Drew Jackson	1978	Tongue River Reservoir
White sturgeon	96	0	Herb Stout	1968	Kootenai River
White sucker	5	5⅓	Fred Perry	1983	Nelson Reservoir
Yellow bullhead	0.72		Wade Fredenberg	1987	Yellowstone River
Yellow perch**	**2.37**		**Vernon Schmid**	**1988**	**Ashley Lake**

*** New Montana record for 1987**
**** New Montana record or tie for 1988**
***** New to Montana's record list**

CONTRIBUTORS

• Many people know that Montana contains the largest remaining grizzly bear population in the lower 48 states. It's not so well known that the "great white bear," as Lewis and Clark described it, was well adapted for open country and ranged across most of western North America until the early 1800s. It disappeared from the plains and much of its former range because of western settlement, receding to the most remote and rugged mountain ranges. A unique segment of Montana—the Rocky Mountain Front—contains the last plains habitat occupied by the grizzly bear. It's tantalizing to contemplate the idea **Mike Madel** poses: These bears *could* be descendants of the plains grizzlies described by Meriwether Lewis in 1805 and painted by Charlie Russell a hundred years later. Turn to "Of Prairie, Bears, and People" on page 2. Madel is a bear management specialist with the Department of Fish, Wildlife and Parks, and he has spent the last 10 years working on grizzly and black bear research and management.

• "On Fishing..." is a peek at the past, but it's also a look into the bright future of Montana's fisheries. Beginning on page 6, **Patrick Graham** and **Art Whitney** reflect on the "fish wisdom" that led to today's wild trout management. They emphasize the importance of preserving "good fish habitat," and tell you what comprises it. They examine how streams came to be classified as "blue ribbon" in the late 1950s. They underscore the importance of regulations and education, and they tackle the ongoing problem of access to your favorite fishing spot. Graham is administrator of the FW&P's Fisheries Division; he took the job on when Whitney retired in 1987—after a 23-year tenure as administrator and a 35-year career with FW&P. The historical flavor of the piece is enhanced by some fine old photos.

• With "Glaring Gnome," *Montana Outdoors* inaugurates a new section, "Nongame Sampler." The article's title comes from a literal translation of the northern pygmy-owl's scientific name, *Glaucidium gnoma*. The "gnome" part is easy to explain—measuring only six to seven inches from the top of its head to the tip of its tail and weighing two to three ounces, the northern pygmy-owl is indeed diminutive. Among its key markings are its small, yellow eyes—in the regular spot. But in addition, two white-edged black spots at the back of the neck suggest eyes. In effect, this small owl can "glare" at you from front or back. Biologists theorize the "false eyes" may deter small birds from attacking the owl from behind. Turn to page 13 for a fascinating bit of life history from **Denver W. Holt** and **Rick Kline**. Holt is director of the Owl Research Institute, Inc., Missoula. He has been involved with owl research since 1979. Kline, whose outstanding photographs are featured in the article, is a wildlife photographer who lives in Polson; he is at work on a book about birds of prey.

• Lying in the extreme southwestern corner of Montana, the Centennial Valley provides unique and important habitat for a variety of wildlife, including a thriving raptor community. The red-tailed, ferruginous, and Swainson's hawks are "Three from the Centennial." These members of the genus *Buteo* are the most numerous and obvious raptors in the Centennial Valley, and all nest there. They also have in common their ability to circle and soar on rising air currents. **Marco Restani** not only wrote the article, but he also provided the photography. He is working on a master's degree in fish and wildlife management at Montana State University, Bozeman, and his article explores some of the research results from his thesis. It begins on page 16.

• Turn to page 25 to try your hand at "Experiencing the Past" through the eyes of an aging medicine man, a hunter with Lewis and Clark, and a miner's daughter in Bannack. As **Dick Ellis** writes, "...each of us can become any of these characters and a hundred more, as we visit Montana's historic and archaeological sites and let our imaginations drift. We can stand on the very ground where prehistoric Indians, explorers, and pioneers stood, and we can walk paths on which adventurers have trod for 10,000 years." The article also provides a handy list of those elements of the Montana State Parks System associated with historic and archaeologic themes—how to get there, what to see, what facilities are available, etc. Ellis is FW&P's parks manager for the Bozeman region. He has a lifelong interest in history, archaeology, photography, and art. You'll see proof of his aptitude in at least two of these—history and art—in the admirable illustrations he did for this article. He is currently working on a series of bronze sculptures of western big game animals.

• A flying ant hatch and a dimplelike rise under an overhanging alder bush aroused **Don Tennant's** curiosity. He spotted a dandy wild cutthroat about 14 inches long, and the fish had begun to gobble ants. Tennant counted the first 250 ants at the rate of one every five seconds. Around 300, the trout's ingestion rate slowed, usually to one ant per 10 seconds or so. At 364, the trout opened and closed its mouth like a person yawning. At 427, a chipmunk climbed up into the alder bush. Turn to "478...479..." to find out just how far the cutthroat's gluttony extended. Tennant is a biologist retired after a 25-year career with the U.S. Fish and Wildlife Service. He is a stream flow consultant and owns and operates Bighorn-Yellowstone Guide Service, Billings. His contribution to our "Perspectives" series begins on page 32.

• The illustration for the cutthroat article is from an original watercolor, "Yellowstone Heritage," by **Rich Stevenson**, Livingston. The depiction of the Yellowstone cutthroat is available as a signed and numbered limited edition of 250 prints. Well-known for his fishing art, Stevenson's work is available at many galleries in Montana, including Holton's of Helena and Master Angler and Yellowstone Angler, Livingston. His work has appeared in many shows, among them the Russell Show and Auction in Great Falls. For more information, contact him at 204 South Fifth; Livingston, MT 59047 (406/222-0341).

• *MO* thanks the following photographers for their contributions to this issue: **Pete** and **Alice Bengeyfield**, Dillon; and **Michael H. Francis**, Billings.

EXPERIENCING THE PAST

article and illustrations by Dick Ellis

Madison Buffalo Jump,
before time was recorded:

It is dawn of the fourth day following the full moon. My vigil is nearly over. For three days and nights, I have called upon the spirits of the Mighty Bison to be good to my people. I have spoken with spirit thoughts and sweet smoke and the songs of my grandfathers. If the spirits have listened, the thunder will soon begin.

Now I feel it—a deep trembling in the air and in the ground as their thousand hoofs and bellowing tongues call to my people, "We are coming, we are coming!" In these last moments, my spirit takes wing. My mind knows what my eyes cannot yet see, as I wait here below the cliffs. My brave runner, swift as the prairie hawk, flies ahead, leading the way. My hunters rise from behind the piled stones, urging them on. They come—they will not turn or stop! As a river of dark water, they tumble from the cliffs and splash on the rocks below. My warriors help them die.

The spirits have been good. My people will live.

Missouri Headwaters
July 28, 1805

I guess I'm luckier than most. At least this hunting duty is a far sight better 'n pullin' them dang boats upstream! Never knew a river could be so long!

When we stopped yesterday and found three rivers all comin' together here, I guess we was all kinda surprised. Captain Clark knew it before us, since he's scoutin' ahead, and the Indian woman kinda knew what was comin' 'cause she was here as a kid. In fact, Captain Lewis says this is right close to where she was captured by some warrin' tribe and carried off to the Mandan villages where we wintered.

Accordin' to Drouillard, Indians been comin' here for a long time. He run across some Indian writin' in a cave below the hill. If they was after beaver, they come to the right place. Get off the main rivers and it's all one big beaver dam.

Maybe when this duty's over, me and Potts will come back and do some

trappin' up the Jefferson. That's the name the Captains gave to the north fork. The other two are the Madison and the Gallatin—after some government bigwigs. From up on that rock yonder, you can get a good view of all three.

Sure pretty country! If the muskeeters weren't so bad, might be a good place to settle.

Bannack, Montana
December 1864

Things certainly have come to life around this town since the Legislature started meeting last week. It's almost like the Rush was on again!

Most people are coming from Virginia City to try to get some law or other passed, or just because they're curious. Lots of them are angry that they have to ride clear over here. They think the Legislature should have sat in Virginia City, since it has the most people now. Rumor is that they would have, except that Mr. Edgerton, being such a Lincoln Republican, wouldn't hold it where there were so many "rebels."

Oh well, not my affair, and I guess they're not all upset, anyway. When my little sister Nellie goes to Miss Darling's school at the Governor's house, she says people are always bringing hams and chickens and venison and such. I wonder if they're just being friendly, or if they think they're buyin' some favors?

Anyway, it's nice to have things hoppin' again—just so they don't get out of hand. I don't need the kind of excitement we had last winter with the Plummer hanging. I can still see the three of them swinging from the gallows up there when I close my eyes. To think he was leading the gang that murdered so many, when all along we thought he was upholding the law. He was such a nice appearing man, too.

Some people still think the vigilantes made a terrible mistake—but I don't. There was something sinister in his eyes....

Today

An aging medicine man, a hunter with Lewis and Clark, a miner's daughter in Bannack—each of us can become any of these characters and a hundred more, as we visit Montana's historic and archaeological sites and let our imaginations drift. We can stand on the very ground where prehistoric Indians, explorers, and pioneers stood, and we can walk paths on which adventurers have trod for 10,000 years.

In these settings, the process of studying, learning, and absorbing our fascinating heritage can be a pleasant and personal one. Here, we can grasp the underlying realities that allow past activities and events to be re-created in our minds. Perhaps it is the desire to "relive" an earlier, simpler time that draws us to these special places.

In Montana, many such places are preserved as elements of the Montana State Parks System. Beginning in 1939 with development of the Lewis and Clark Caverns, Montana's park system has provided a means of preserving and managing natural, cultural, and recrea-

ANACONDA SMELTER STACK
The old Anaconda Copper Company smelter stack, completed on May 5, 1919, is one of the tallest free-standing brick structures in the world at 585 feet, 1.5 inches. The inside diameter at the bottom is 75 feet and at the top, 60 feet. The stack can only be viewed at a distance. Listed in the National Register of Historic Places. [Undeveloped. In Anaconda on Montana 1; 1 acre, 5,588 feet elevation; 406/542-5500]

BANNACK
The ghost town of Bannack, site of Montana's first major gold discovery in 1862, became Montana's first territorial capital in 1864. The main street is lined with historic log and frame structures that recall Montana's formative years. Bannack Days, with historic displays, activities, and events, is conducted in July each year. The visitor center and campground are open from mid-May through September. A group picnic site is available on a reservation basis. National Historic Landmark. [5 miles south of Dillon on I-15, then 21 miles west on Secondary 278, then 4 miles south on county road; 198 acres, 5,890 feet elevation; 406/834-3413]

BEAVERHEAD ROCK
Named by the Shoshoni Indians for its resemblance to the head of a swimming beaver, this large rock outcrop was an important landmark for the Lewis and Clark Expedition. It was recognized by Sacajawea as being near a gathering place of her tribe where the expedition might obtain horses for the overland journey. Listed in the National Register of Historic Places. [Undeveloped. 14 miles south of Twin Bridges on Montana 41; 71 acres, 5,000 feet elevation; 406/994-4042]

BEARS PAW BATTLEFIELD
Site of the surrender of Chief Joseph and the Nez Perce on October 5, 1877. After a 1,700-mile retreat through some of the roughest country in the West, Chief Joseph, tired and disheartened, made his famous speech of surrender: "From where the sun now stands, I will fight no more forever." [16 miles south of Chinook on Secondary 240; 200 acres, 3,842 feet elevation; 406/228-9347]

CHIEF PLENTY COUPS
Situated within the Crow Reservation in south-central Montana, this park was the home of Plenty Coups, last chief of the Crow. Plenty Coups' log home and store remain as evidence of the chief's efforts to lead his people in adopting the lifestyle of the white man. [1 mile west of Pryor on county road; 195 acres, 4,100 feet elevation; 406/252-1289]

CLARK'S LOOKOUT
Projecting above the dense cottonwoods and willows along the Beaverhead River, this rock outcropping provided an opportunity for members of the Lewis and Clark Expedition to view the route ahead. [Undeveloped. In Dillon on I-90 at Montana 41 exit, .5 mile east, then .5 mile north on county road; 7 acres, 5,406 feet elevation; 406/834-3413]

COUNCIL GROVE
This park marks the site of the 1855 council between Isaac Stevens and the Flathead, Kutenai, and Pend d'Oreille Indians. Here the Indians signed the Hellgate Treaty and relinquished their ancestral hunting grounds in exchange for a reservation in the Mission Valley. The area provides good rainbow and brown trout fishing in the Clark Fork River. [In Missoula on I-90 at Reserve Street exit, 2 miles south on Reserve Street, then 10 miles west on Mullan Road; 187 acres, 3,000 feet elevation; 406/542-5500]

ELKHORN
Fraternity Hall and Gillian Hall, two picturesque structures in this early-day silver mining ghost town, have been preserved as outstanding examples of frontier architecture. Each has been recorded in the Historic American Buildings Survey. Forest Service campgrounds are nearby. [Undeveloped. I-15 at Boulder exit, then 7 miles south on Montana 69, then 11 miles north on county road; 1 acre, 6,400 feet elevation; 406/994-4042]

FORT OWEN
Built of adobe and logs, Fort Owen is the site of the first permanent white settlement in Montana. Father Pierre DeSmet came to the area in 1841 and established St. Mary's Mission among the Flathead Indians. In 1850, Major John Owen established the fort as a regional trade center. Period furnishings and artifacts are displayed in the restored rooms of the east barracks. Listed on the National Register of Historic Places. [25 miles south of Missoula on U.S. 93 to Stevensville junction, then .5 mile east on Secondary 269; 1 acre, 3,300 feet elevation; 406/542-5500]

GIANT SPRINGS
Discovered by the Lewis and Clark Expedition in 1805 and one of the largest freshwater springs in the world, Giant Springs flows at a measured 338 million gallons of water per day. Today, visitors can picnic by the Missouri River and visit the nearby Rainbow Falls overlook, the visitor center, and the fish hatchery. A food and beverage concession and group picnic site are also available. [3 miles east of U.S. 87 on River Drive, Great Falls; 117 acres, 3,312 feet elevation; 406/454-3441]

GRANITE
The remnants of this once thriving 1890s silver boom town bear stark witness to Montana's boom-and-bust mining history. The Superintendent's House and Miners Union Hall have been included in the Historic American Buildings Survey. [Undeveloped. 6 miles east of Philipsburg on forest road; 1 acre, 7,050 feet elevation; 406/542-5500]

MADISON BUFFALO JUMP
An outstanding example of a site where Native Americans stampeded herds of bison over a precipice in order to secure the necessities of food, clothing, shelter, and tools. Interpretive displays help visitors understand the events that took place here over 2,000 years ago. [23 miles west of Bozeman on I-90 at Logan exit, and 7 miles south on Buffalo Jump Road; 618 acres, 4,400 feet elevation; 406/994-4042]

MEDICINE ROCKS
As its name implies, Medicine Rocks was a place of "big medicine" where Indian hunting parties conjured up magical spirits. "As fantastically beautiful a place as I have ever seen," said one of its first tourists in the late 1800s, a young rancher named Teddy Roosevelt. Weathering has given the soft sandstone rock formations a Swiss-cheese look. The park is also a haven for mule deer, antelope, and sharp-tailed grouse. [25 miles south of Baker on Montana 7; 316 acres, 3,441 feet elevation; 406/232-4365]

MISSOURI HEADWATERS
Established where Lewis and Clark discovered the Jefferson, Madison, and Gallatin rivers joining to form the Missouri River, Missouri Headwaters was a geographical focal point important to early native Americans, trappers, traders, and settlers. The park provides a campground, picnic areas, foot trails to points of interest, and interpretive displays of the area's cultural and natural history. River floating and fishing are popular activities. [3 miles east of Three Forks on I-90 at Three Forks exit, then east on Secondary 205, then 3 miles north on Secondary 286; 527 acres, 4,100 feet elevation; 406/994-4042]

PARKER HOMESTEAD
This sod-roofed log cabin is representative of the thousands of simple frontier homes that provided shelter for hopeful pioneers who settled Montana. [Undeveloped. 8 miles west of Three Forks on Montana 2; 2 acres, 4,050 feet elevation; 406/994-4042]

PICTOGRAPH CAVE
The Pictograph, Middle, and Ghost cave complex was home to generations of prehistoric hunters. Over 30,000 artifacts have been identified from the park. A paved .25-mile trail allows you to view the rock paintings, known as pictographs, that are still visible in Pictograph Cave, largest of the three. Picnic sites, under ancient box elder trees, are also provided. National Historic Landmark. [In Billings on I-90 at Lockwood exit, then 6 miles south on county road; 22 acres, 3,600 feet elevation; 406/252-4654]

ROSEBUD BATTLEFIELD
Site of the June 17, 1876 battle between the Sioux and Cheyenne Indians and General George Crook's cavalry and infantry. One of the largest Indian battles ever waged in the United States, it set the stage for the Indian victory eight days later when Lieutenant Colonel George A. Custer and his immediate command were wiped out on the Little Bighorn. [Undeveloped. 25 miles east of Crow Agency on U.S. 212, then 20 miles south on Secondary 314, then 3 miles west on county road; 3,052 acres, 4,300 feet elevation; 406/232-4365]

ULM PISHKUN
This prehistoric bison kill site exhibits an extensive network of rock drive lanes used by primitive hunters to direct the stampeding buffalo to the cliff's edge. The park has an interpretive trail and picnic facilities. An added attraction is a protected colony of black-tailed prairie dogs. [10 miles south of Great Falls on I-15 at Ulm exit, then 4 miles northwest on county road; 170 acres, 3,700 feet elevation; 406/454-3441]

MOUNT HAGGIN
Within this diverse management area are found some of Montana's most important archaeological and historic resources. Placer and quartz mining, lumbering, and livestock production are represented here in the earliest stages, and physical remnants are located throughout the area. Although largely undeveloped, an interpretive overlook is available and primitive camping, picnicking, and hiking opportunities abound. [Approximately 10 miles south of Anaconda on Highway 274; 54,000 acres, 6,000 to 7,000 feet elevation; 406/994-4042]

tional resources in the public interest.

During this Centennial year, it is appropriate that sites associated with historic and archaeological themes should receive special attention. These sites within the park system encompass a wide variety of opportunities and experiences. (Please refer to the accompanying site list.)

Historic Site Management

Preservation. The preservation and protection of the physical remnants of the past are critical aspects of historic site management. Old structures, rusted implements, overgrown trails that were once roadways—such things can serve as physical ties to the past that make an historic place or event "real" to today's visitor. If these physical remnants are lost through ignorance or intent, they can never be regenerated. No written description, photograph, or drawing can ever convey the same sense of reality. Unlike most natural resources, these historic resources are not renewable. It is the responsibility of today's society to carefully weigh the results of actions that sever our ties with the past and diminish the opportunity for future generations to witness their heritage. One of the primary functions of the Montana State Parks System must be to provide a mechanism whereby such physical remnants can be acquired, preserved, and protected.

Interpretation. While preservation and protection are critical, the function of interpretation is also a key element in the role of state parks. Interpretation can be accomplished through a wide array of media and techniques, such as signs, graphic displays, brochures, video presentations, guided tours, living history programs, and festivals. All of these techniques are designed to enhance the visitor's understanding, appreciation, and enjoyment of a site or event and, perhaps most important, to stimulate curiosity and imagination. Regardless of how it is done, interpretation must be sensitively applied to avoid intruding on the special historic "atmosphere" inherent in such places.

Often, the simple feeling of permanence—of man's long presence—is enough. Simply to observe the weathered remnants of the past and to know that something important happened here—that people much like us lived and laughed and struggled and grew strong and died here—often that is all we need to know about a place to feel close to the past.

At other times and at other places, it is appropriate that we seek out more—that we delve into the details of events that connect the intertwining threads of history—so that we can weave a more complete understanding of people and actions and events crucial to the evolution of a culture, the formation of a society, or the great opportunities which lie in our past—and in our future.

ON FISHING...

continued from page 8

length of these streams had been altered and that five times as many trout were found in unaltered reaches.

Results of these studies stirred the Montana Jaycees and Western Montana Fish and Game Association to take up the cause. They were successful in securing passage of the Stream Protection Act in 1963. This was the first legislation of its kind in the nation, and it was so controversial that the bill was enacted for only two years. But in 1965 when it was re-introduced, only one dissenting vote was cast. The act requires local and state governments to get a permit from the department before altering a stream. Today many federal agencies have a similar agreement with the department.

The Natural Streambed and Land Preservation Act was passed in 1975, extending stream bank protection to cover activities of private landowners. This act is administered by local conservation districts with FW&P represented on the three-person field review team for each project. Besides the direct benefits to streams and adjacent landowners, this act provided the opportunity for landowners and fisheries biologists to develop an invaluable working relationship.

The third leg of the habitat conservation program was the amount of water flowing in streams. This was first addressed by the 1969 Legislature which passed a bill reserving a portion of flow in reaches of 12 blue ribbon streams for instream fisheries use. This established a priority date of 1970 or 1971 in these streams and did not affect water rights existing before that date.

In 1973, the Water Use Act was passed and explicitly recognized instream flow as a beneficial use of water. This act also set up a process by which municipalities, conservation districts, FW&P, and others could reserve water for future use. In 1978, the Board of Natural Resources granted water reservations for the Yellowstone River Basin. Interested parties are now preparing similar reservations for the upper Clark Fork River and the Missouri River Basin.

As before, these actions do not affect people already holding water rights. Reserved water can keep droughtlike conditions from becoming more frequent, but cannot improve stream flow because, in most cases, the streams are already overappropriated. Thus, the debate over allocation of water continues.

FW&P has been successful in negotiating agreements with operators of many private and federal dams to provide stream flows generally beneficial to fisheries. An example is Hebgen Reservoir operated by the Montana Power Company on the upper Madison River.

Because of the interest, commitment, and concern of its citizens, Montana has many more options for maintaining quality fisheries than most other western states. In other states, the effort to conserve habitat has been significantly compromised as a result of loss of many miles of stream. Quality habitat has allowed Montana to lay claim to being prime "wild trout country."

And in the case of habitat protection, what is good for wild trout is also good for the warmer water species like walleye, sauger, paddlefish, and bass. Montana also boasts the largest number of miles of suitable habitat for its native warm-water species of any state in the region.

REGULATION AND EDUCATION

In 1864, in Montana Territory, vigilantes strung up Sheriff Henry Plummer. Two years later, Nelson Story drove the first bunch of Texas longhorns over the Bozeman Trail. In between, Montana established its first fishing regulation.

That first regulation is still in effect in most waters today; it limits anglers to a single line or rod in hand. It was 50 years before limits would be imposed. In 1928, the Fish and Game Commission established a daily limit of 40 fish, not to exceed 20 pounds and one fish. No more than five fish could be less than seven inches long, and the limits applied to all species combined. The season was closed from March 15 to May 20.

The limit was liberal by today's standards, but could be exceeded even now if one combined limits for various species. By 1939, the commission had reduced the limit for trout to 15 fish, not to exceed 15 pounds and one fish. By 1941, the season was open from May 24 through October 14.

FW&P PHOTO

Wives of hatchery personnel aided a fisheries study by tagging fish at the Jocko River Trout Hatchery in Arlee in the 1960s.

As was the case with the stocking program, the limits often had no basis in biology, and they became increasingly complex on some waters. Political pressure and the preferences of local wardens, hatchery managers, and anglers created a diversity of regulations.

In 1959, the commission reduced the limit to 10 trout or 10

pounds and one fish (which is still in effect on some waters). The commission relied increasingly on biological information to establish regulations, while trying to standardize them where possible.

Because use was relatively small, angler harvest was not having much impact on fish populations. This began to change as use increased and public desires and perceptions shifted.

In the last two decades, use has increased by about 50% statewide, with much of the increase occurring on selected waters. In 1978, studies found that angler harvest was reducing the number of large trout in the Madison River. Most anglers using the river wanted to catch larger wild trout even if they could not keep them. That year, the Fish and Game Commission established the first special management area by adopting a catch-and-release regulation on a portion of the upper Madison River.

The limit for trout on most streams today has been reduced to five fish, with only one over 18 or 14 inches, depending on the water's productivity. This limit attempts to spread the catch among more anglers. In combination with a slot limit (which prohibits anglers from keeping prime spawning-size fish, but allows them to keep only smaller and the very largest fish), it can also increase the size of fish in the catch.

The trend toward special management areas has continued; eight lakes and portions of 20 streams now carry this designation. To balance the desires of those who seek larger trout to catch but not necessarily to keep and those who seek fish to eat, only a portion of a stream usually has special regulations. This provides diversity and an opportunity to satisfy different views of quality.

Regulations also protect species unable to reproduce or survive as successfully as others due to low water or other problems. On both the Jefferson and upper Bighorn rivers, anglers can only catch and release rainbow trout but can keep brown trout.

Similar restrictions have been placed on some cutthroat trout waters. However, because cutthroat often interbreed with rainbow trout, species-specific cutthroat regulations are difficult to enforce, particularly west of the divide. So the commission has instituted a voluntary catch-and-release program for cutthroat trout and is trying to to promote this practice.

Regulations have also been utilized to reduce conflicts between groups of users. On two sections of the upper Madison River, it is illegal to fish from a boat. This provides a higher quality fishing opportunity for shore anglers in those sections, without resorting to complex and more expensive regulation of numbers of boats or anglers.

Special regulations are often accompanied by limits in type of gear, because studies have consistently shown that use of bait causes much more mortality of released fish than use of artificial gear. This has created conflicts between these two groups. To resolve these differences, the department's river management plans bring groups together to work on developing a balanced plan for the river and its fisheries.

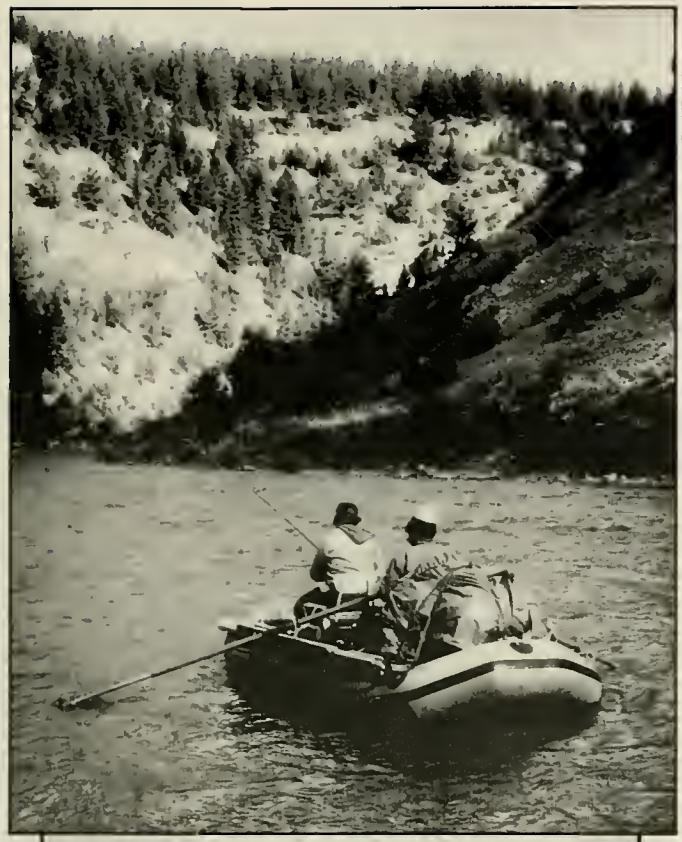
The plans set management objectives and address access, use, habitat, and fishing regulations. We also use statewide and local preference and opinion surveys in establishing these management objectives. All anglers thus have a say in future management.

GETTING TO THE WATER

For many years, public access to some waters has been viewed as a problem. In the 1940s and '50s, department acquisition of game ranges—which sometimes included access to waters—was about the only activity. In 1964, the department reorganized. A newly formed Recreation and Lands Division was charged with acquiring, developing, and maintaining fishing access sites. A few years later, the State Parks System moved from the Highway Department to the Fish and Game Department, and a Parks and Recreation Division was formed.

DAVE BOOKS

Fish habitat protection, management for wild trout, and special regulations have combined to make Montana's blue ribbon trout streams the envy of the West.



DAVE BOOKS

A vigorous fishing access program has provided more than 270 sites across the state where fishermen and floaters can enter lakes and streams.

In 1977, anglers pushed for expansion of the Fishing Access Program and supported a bill earmarking a portion of their license fee for purchase of new access sites. That now includes $5 from the non-resident season license, and $1 from the resident season and non-resident two-day license.

About 270 fishing access sites dot Montana. Many are small and undeveloped; others are larger, providing dispersed fishing access as well as camping. These sites serve other needs as well. A recent survey indicates that many visitors to fishing access sites do not fish, but use the sites to picnic, view nature, or access water for recreational floating.

One goal of the access program is to provide for a four-hour float between sites on larger rivers. Sites are closer together in more heavily used areas. In general, most major rivers now have adequate access, and the department's attention is shifting toward providing access to small or medium-sized lakes and reservoirs, particularly near population centers, and for warm-water fishing.

In 1987, another department reorganization shifted responsibility for the Fishing Access Program to the Fisheries Division, although the Parks Division continues to have an important role, including planning for and maintaining these access sites.

Today, site development is lagging. The program is being restructured to bring development into balance with acquisition. This has been aided by an expanded Federal Sport Fish Restoration Program which provides additional dollars for development of access sites.

The other major change in access occurred when the Montana Supreme Court upheld a lower court decision which determined that waters of the state could be used by the public for water-based recreation. The decision was narrowed by the Legislature in 1985, but it continues to ensure use of Montana waters for fishing and floating. The decision does not seem to have significantly altered the amount or pattern of people's use, but it assures public use of waters once legal access has been obtained.

ON FISHING...

What will Montana's fisheries and water resources provide in 100 years? What will typical anglers look like? What values will they hold? No one can say.

Some trends and events now taking place will likely change the shape of Montana's fisheries over the next 10 to 20 years, but exploring those would require another article. How might Fish, Wildlife and Parks prepare to meet those challenges?

Diversity is the heart of FW&P programs and quality is the soul. We can best meet the public's future needs if we can maintain a healthy heart and soul. Continued commitment to conserving habitat, preserving wild species, and controlling introduction of new species will help us preserve our options.

The FW&P will continue to weigh the views and opinions of diverse groups in determining which course to pursue: increased involvement of the public in setting management goals; recognition of the role of Indian tribes and private and government landholders; and recognition that specific needs of the elderly, single-parent families, women, and the disabled require more careful thought.

Educating the public in wise use of resources, encouraging development of a conservation ethic, and becoming more sensitive to the needs of other groups will help ensure that preferred management options can be fulfilled.

Montana's fisheries program has been built on the actions of hundreds of individuals over many years. Anglers, conservationists, ranchers, legislators, business people, and those who capture our imagination with pen or brush have given life to the future of Montana's fisheries.

As they were 100 years ago, today's problems will be solved and opportunities captured by cooperation and action at local levels. FW&P's role will be to bring people and resources together, and to share experience and expertise.

One such cooperative accomplishment was that of the Bitterroot Conservation District, Bitterroot Chapter of Trout Unlimited, and local irrigators—with assistance from the state, the Northwest Power Planning Council, and Montana Power Company—to put more water into the Bitterroot River. While the circumstances may be unique, the potential for a solution lay idle for over three decades. It was not until people—who at other times and in other situations might have been adversaries—forged a solution. This full story, like many others, will be told another time. Such a story is both an accomplishment to cherish in this Centennial year and a bright sign for the future of Montana's fisheries. ■

478...479...

by Don Tennant
illustrated by Rich Stevenson

ON AUGUST 18, 1987, I fished about a mile of the South Fork of the Sun River, downstream below the Benchmark Trail Head Bridge.

As I approached the second steep gorge through which the stream had cut, I was fishless. The stream was low and clear, and I could see every rock and pebble. I was spinfishing with a UL rod and 2-lb. line. After an hour of fishing, I had decided there weren't any fish of catchable size in the stream.

Then I noticed the start of a flying ant hatch and a dimplelike rise under an overhanging alder bush just downstream, along the relatively shallow left stream bank. It was 7:30 p.m., and the alder was the only overhanging cover along the entire reach of stream I had fished. I cast my 1/16th-oz. lure under the bush, but no strikes. Intrigued by another half dozen rises, I climbed out of the stream, propped my rod against the bush, and—on my belly—snaked my way out on the thick branches until I was at a spot right over the feeding fish. This move dislodged several fist-sized rocks that rolled into the stream, but the fish resumed feeding in about 10 seconds. Under cover of the alder, I was sure small fingerlings were nipping at the floating ants which were about the size of a No. 18 fly.

TO MY SURPRISE, I saw a dandy wild cutthroat trout about 14 inches long sipping floating terrestrials, just like we would gobble peanuts or popcorn. While continuing to count each ant the cutthroat consumed, I was delighted to find only one fish in the rather shallow and limited pool under this lone alder bush.

The trout fed primarily from about six inches above a rock, one and one-half feet under the surface (approximately the same length as the fish), centered in the deepest part of the pool. Most rises were within a foot of its favorite niche over the submerged rock. Spotting an ant, the fish would occasionally drift back (to the left or midstream) as much as three feet. It moved ahead (to the right, next to the bank) up to one and one-half feet at a time.

The cutthroat ate the first 250 ants at the rate of one every five seconds, or faster. Around 300, the trout's ingestion rate slowed, usually to one ant per 10 seconds or longer. At 364 ants, the trout slowly opened and closed its mouth several times, like a person yawning. I didn't think it would eat many more ants and almost cheered when it finally took No. 400! It kept taking ants between occasional "yawns." At 427, a chipmunk charged, ran up the outside of my pant leg and across my back and shoulder, then climbed up into the bush.

BY 8:30, DAYLIGHT WAS FADING, and my fishing partner, Ron Gay, came downstream looking for me. We were in grizzly country, and we had agreed to meet some distance upstream. I carefully backed out of the bush and we watched together for about five minutes as the trout took the last few of its 480-ant total.

Having worked as a fisheries biologist most of my life, both in the field and in hatcheries, I have had many opportunities to observe fish and their feeding habits. However, this was a once-in-a-lifetime chance to observe one fish in a shallow, restricted pool of very clear water begin and end its feeding spree on floating insects. I don't think I missed any rises from start to finish, but if I were off by only 20, this could reasonably have been a cutthroat gorge of 500 terrestrials in about one hour! Biologists have analyzed countless thousands of mixed up, partly digested stomach samples, but I doubt if any of them resulted in as accurate a count of individual insects ingested by one fish. ■

Yellowstone Heritage